3 Insects

The Florida Buggist

Official Organ of the Florida Entomological Society.

VOL. 1 SUMMER NUMBER NO. 1

June 21, 1917

THE FLORIDA ENTOMOLOGICAL SOCIETY

ITS HISTORY AND AIMS

On January 5, 1916, eleven men interested in entomology, met at the University of Florida and formed the Florida Entomological Society. The editor of the *Entomological News*, published in Philadelphia, in noting this event, stated that ours is the first entomological society to be formed in the South. The first officers were: President, J. R. Watson, Experiment Station; vice-president, Wilmon Newell, Plant Commissioner; secretary-treasurer, R. N. Wilson, U. S. Bureau of Entomology; member of the executive committee, Dr. H. S. Davis, Department of Zoology, University of Florida.

Since then monthly meetings have been held except during the summer months, June to August. Several special meetings have also been called.

There is presented at each meeting one or more papers on some entomological subjects. These are freely discussed by the members present. Under the heading of "Brief and Timely Notes" members present observations on insects that appear to be of interest at that time, review publications or some other event of an entomological nature. This has been one of the most interesting feasures of the meetings. The titles of the papers so far presented are:

FUNGUS DISEASES OF SCALE INSECTS AND WHITEFLIES—*Dr. E. W. Berger.*

THE VELVET-BEAN CATERPILLAR, *Anticarsia gemmatilis*—*J. R. Watson.*

SOME METHODS OF HATCHING, REARING AND SHIPPING INSECTS—*R. N. Wilson.*

THE ECONOMIC IMPORTANCE OF INSECTS ON NURSERY STOCK —*F. M. O'Byrne.*

SOME FLORIDA APHIDS—*A. C. Mason.*

THE DICTYOSPERMUM SCALE—*A. C. Mason.*

COLOR FORMS OF THE LUBBER GRASSHOPPER—*R. N. Wilson.*

Delphastus Catalinae—A LADY-BEETLE FROM CALIFORNIA WHICH FEEDS ON WHITEFLIES—*J. R. Watson.*

THE OKRA CATERPILLAR—*H. L. Dozier.*

THE BLACK SCALE—*E. W. Berger.*

SOME PHASES OF CHINCH BUG INVESTIGATIONS—*R. N. Wilson.*

THE MOLTING OF MAYFLIES—*H. S. Davis.*

CONTROLLING PUMPKIN BUGS IN CITRUS GROVES—*J. R. Watson.*

REPELLING UNDESIRABLE BOARDERS—*K. E. Bragdon.*

BUG HUNTING AS A PASTIME—*Prof. W. S. Blatchley,* Indianapolis, Ind., and Dunedin, Fla.

THE CANE BORER—*J. C. Goodwin.*

ARTIFICIAL REARING OF VEDALIA—*A. C. Mason.*

BEE KEEPING IN FLORIDA—*Frank Sterling.*

LINSEED OIL IN BORDEAUX MIXTURE—*E. W. Berger.*

At the February meeting the Society voted to become a section of the Florida Academy of Science. Provision was made whereby those who, on account of the expense or other reason, do not care to become members of the Academy, may become associate members of the Society. Such members will have to pay only the annual dues of the Society (fifty cents.) They will have all the privileges and rights of members except a vote. The membership fee in the Florida Academy of Science is one dollar additional.

The aim of the Society is to stimulate an active interest in entomology on the part of Floridians. There is at the present time a marked dearth of amateur entomologists in the State.

Membership in the Society is by no means limited to professional entomologists. Anyone who is interested in, or desires information on "bugs" may become a member. Indeed, only a small proportion of the present members could be considered as professionals. The desire is to include among the members everyone interested in the insect fauna of the State, whether a resident or not.

The regular meetings are held on the third Monday of each month either in the late afternoon, 4:30 to 6:00, or in the evening, and usually in Science Hall at the University. Special meetings are called when anything of unusual interest arises. The meetings are open to anyone who cares to attend, whether or not he is a member of the Society.

We are anxious to have everyone in the State who may be interested to become a member. Non-resident members will have an opportunity to attend whenever they happen to be in Gainesville on a meeting night. Even if they never attend the meetings it should be to their distinct advantage to affiliate with us and in that way keep in closer touch with entomological happenings. Each member receives a notice of each meeting with the subject of the paper. If it is one in which he is especially interested, a non-resident member can probably arrange with the author to see the paper. It is, furthermore, the intention of the Society to hold special meetings when there are likely to be many non-resident members in Gainesville, such as the meeting week of the Citrus Seminar, or of canker inspectors. Perhaps, ultimately, arrangements can be made to hold occasional meetings in other cities on especial occasions, as for instance the meeting of the Florida State Horticultural Society.

Arrangements will also be made whereby members can get such insects identified as they may care to send in. The Experiment Station, State Plant Board, and the State Museum are each getting together reference collections which will facilitate identification.

OFFICERS AND MEMBERS

President—E. W. BERGER, Entomologist, State Plant Board, Gainesville, Fla.

Vice-President—H. S. DAVIS, Prof. of Zoology, University of Florida.

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Schumacher, Henry E., Inspector, St. Plant Bd., Homestead, Fla.

(Continued on page 8)

The

FLORIDA BUGGIST

Official Organ of The Florida Entomological Society, Gainesville, Florida.

PROF. J. R. WATSON..Editor
DR. E. W. BERGER..Associate Editor
K. E. BRAGDON..Business Manager

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THE FLORIDA BUGGIST

At the April meeting of the Florida Entomological Society the proposal was made by Dr. Berger that the Society publish a periodical to be known as "THE FLORIDA BUGGIST." The publication that herewith makes its initial bow to the entomological world is the result of that suggestion.

As the official organ of the Society it will contain the proceedings of the meetings, including at least an abstract of the papers presented. It will, as far as possible, publish original contributions on entomological subjects that members of the Society may offer, and any articles dealing with Florida insects by persons not members.

It will contain brief and timely notes on insects which, for any reason, are of especial interest at the time, such as new additions to the known fauna of the State, unusual outbreaks of common or rare species, pests liable to be introduced into the State, etc. It will also contain personal notes on members of the Society.

A section which we hope to make of value to readers is that of insects which, judging from past experiences, are likely to be troublesome during the season covered by each issue, i. e., the three months following its publication. Forewarned ought to be forearmed, and we hope by this means to supply our readers with some entomological armaments. We plan ordinarily to give under each insect the plant it attacks, the nature of the injury, the date of its probable appearance, control measures and references to literature.

We plan also to include reviews and notices of books, articles, bulletins, etc.

We hope that each and every member of the Society will take a personal interest in THE BUGGIST. Send us material in the form of original articles, notes, personal items, etc., as well as subscribers. The paper is yours.

TAKE NOTE

Our readers and members are requested to take note of the advertisements carried in this issue. A publication of this kind cannot be kept up without carrying advertisements to help in paying the cost of printing. The mere fact that ads. of certain companies appear in this paper is sufficient guarantee of their integrity, and readers need not hesitate in recommending their products. We should each one of us aid our advertisers in every legitimate way, since they in their turn aid us in keeping up this publication. If we can bring profitable returns to those companies it will mean more advertising matter for us and a larger and better publication will naturally result. This is not a magazine for profit, and every cent received will be used in making THE FLORIDA BUGGIST worthy of the perusal of anyone interested in the class of subject matter with which it deals.

K. E. B.

BRIEF AND TIMELY NOTES

On February 25 an adult specimen of the Mourning-cloak Butterfly *(Vanessa antiopa,* L.*)*, was observed by Prof. J. R. Watson at Gainesville, Fla. This appears to be its farthest south record.

The Cottony Cushion Scale *(Icerya purchasi,* Mask.*)* is now known to occur as far north in Florida as Gainesville. Available information indicates that the pest came to Gainesville on contraband nursery stock from Pinellas County.

The caterpillar of the Spice-bush Swallowtail *(Papilio troilus,* L.*)*, has twice been observed feeding on camphor at Gainesville, and one adult reared. In one instance the caterpillars were reported as abundant.

The Greenhouse Thrips *(Heliothrips haemorrhodalis,* Bouche*)* is now uncommonly severe in the State on citrus, avocado, mango and coleus.

The Citrus Spiny Whitefly *(Aleurocanthus woglumi* Ashby*)* is reported as severe in Cuba, Jamaica and New Providence.

This pest is not in Florida. It is estimated that it would eventually cost approximately $3,500,000 to spray the 21,000,000 citrus trees now in Florida three times per year in order to control it if introduced. This is 100 times the amount of money that the State Plant Board now spends annually to keep it and other insects and diseases out, and to keep those already in from further spreading. This estimate does not include the cost of eradicating canker.

Among the bulletins recently put out by the Fla. Ag. Exp. Station are Bul. 134 on Florida Truck and Garden Insects, and Bul. 136 on the Control of Root-knot by Cyanamid.

Mr. H. L. Dozier, Laboratory Assistant in the Dept. of Entomology of the Expt. Station, and a charter member of our Society, has accepted a position with the U. S. Bur. of Entomology and is located at Columbia, S. C. Mr. Dozier took his master's degree in entomology at the University in June. His thesis, "An Ecological Study of the Piney Woods and Hammock Insects of the Gainesville Region," may be found in the University Library.

Mr. A. C. Mason, also a charter member of this Society, is now with the Federal Horticultural Board, U. S. D. A., and is located at Laredo, Texas.

Prof. H. S. Davis, the vice-president of our Society, will spend the summer vacation at the U. S. Bur. of Fisheries Laboratory at Fairport, Iowa.

Our Society has already contributed two members to the military forces of the nation.

Professor W. S. Blatchley, author of "Coleoptera of Indiana" and "Rhyncophora of the Eastern United States," addressed the Florida Entomological Society at Gainesville on the evening of February 5th. The subject presented was "Bug Hunting as a Pastime." Professor Blatchley is not a newcomer to Florida, and now spends a part of each year at his winter home at Dunedin. Other books written by him are "Boulder Reveries," "Woodland Idyls," and his well-known Florida book, "A Nature Wooing at Ormond-by-the-Sea."

March 29, 30 and 31, the Association of Cotton States Entomologists held their meetings at the University of Florida. Timely topics in regard to plant quarantine regulations were discussed. Besides entomologists, many of whom have charge of inspection and quarantine work, other chiefs of inspection departments of other states, including those in charge of Citrus Canker eradication, were present. The district inspectors in the

Citrus Canker eradication work in Florida had also been invited to be present. One whole day was therefore given up to a discussion of Citrus Canker. Among the prominent visitors present from without the State were: K. F. Kellerman, Washington, D. C.; W. D. Hunter, Washington, D. C.; A. C. Morgan, Tenn.; R. W. Harned, Miss.; Geo. G. Becker, Ark.; E. R. Jones, La.; E. Lee Worsham, Ga.; E. L. Ayers, Texas; Geo. L. Peltier, Ala.; W. E. Hinds, Ala.; J. B. Garrett, La.; W. A. Thomas, S. C.; Dr. O. F. E. Winberg, Ala., and Dr. W. H. Ludewig, Ala.

On the evening of March 29th, the Florida Entomological Society gave a smoker to the visiting entomologists and others attending the Association of Cotton States Entomologists, at which Florida products only were served, namely, grapefruit juice, giant pecans, oranges and other citrus fruits, and Gainesville-made cigars. About 200 attended the smoker. Dr. E. W. Berger gave a brief account of the artificial rearing of Vedalia, or Australian Lady Beetle, and the propagation of the Red Whitefly Fungus in pure cultures. Professor Wilmon Newell, Plant Commissioner, was toast-master of the evening.

THE FLORIDA ENTOMOLOGICAL SOCIETY

(Continued from page 4)

Stirling, Frank, General Inspector, St. Plant Bd., Gainesville.
Swanson, A. L., Inspector, St. Plant Bd., Cocoa, Fla.
Tedder, George E., Inspector, St. Plant Bd., Cocoa, Fla.
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Vaughn, Molloy C., Inspector, St. Plant Bd., Wauchula, Fla.
Walker, Shirley, Inspector, St. Plant Bd., Wauchula, Fla.
Wilson, C. E., Asst. Entomologist, St. Plant Bd., Gainesville.
Wilson, G. H., U. S. A., Ft. McPherson, Ga.
Wilson, R. N., County Agr. Demons. Agent, West Palm Beach. Fla.
Woodruff, Seth L., Inspector, St. Plant Bd., Sanford, Fla.
Yothers, W. W., U. S. Bur. of Entomology, Orlando, Fla.

ENTOMOLOGICAL FRIGHTFULNESS

If the common citrus whitefly is capable of such a thing, he would have a nervous chill could he but see what those attending the May meeting of the Society saw. Up in the attic of the State Plant Board Dr. Berger and Mr. Wilson have some two thousand bottle-cultures of Red Aschersonia, or Red Whitefly Fungus, ready to send out to whitefly afflicted growers as soon as the rainy season sets in.

ENTOMOLOGY IN THE PREPAREDNESS CAMPAIGN

It is very important now, when the fortunes of the Nation may be at stake, that all the crops planted should produce the most possible. The cost of plowing, fertilizer, seed and cultivation is much the same whether a grower gets a half crop or a whole crop from the investment. At all events, a little greater effort and watchfulness at the critical time may result in a full crop, whereas letting up at a certain stage may result in getting only half a crop.

It appears to be a fact that, when a crop is planted in greater quantity, "bugs" are likely to attack it in larger numbers. We cannot attribute foresight to the "bugs," of course, but the farmer creates the opportunity and the bug, if about, takes it, on the principle, I presume, that "Nature abhors a vacuum." Given a place to live, something will find it, thrive and multiply.

It is apparent, therefore, that those who are trying to do their "bit" toward assuring the food supply of the Nation may experience much greater losses than usual from insect depredations, unless they keep a sharp lookout. *Watch that bug,* and *swat that bug* are imperative commands, voiced by the law of self-preservation. Now is the time, also, when growers should make more and better use than ever of the agencies provided by the government, state and federal, for the purpose of assisting in the control of insect pests and diseases. Of such agencies there are now several: The Florida Experiment Station and the State Plant Board, both at Gainesville, and the Bureau of Entomology, U. S. D. A., Washington, D. C. This latter agency also maintains two resident entomologists in Florida, namely; Mr. W. W. Yothers at Orlando and Mr. J. B. Gill at Monticello, Fla. While each of these agencies has its peculiar field of work, letters and specimens addressed to each will be promptly referred to the proper agency when necessary.

Entomologists all over the country are now making greater efforts to assist in the control of insect pests, by forecasting outbreaks, furnishing accounts of remedies to the press, and in other ways. The Bureau of Entomology, U. S. D. A., Washington, D. C., has inaugurated an "Emergency Entomological Service" which has for its object the gathering of information on insect outbreaks and furnishing timely information as to methods of control. This Bureau, under the direction of Dr. L. O. Howard is stationing additional entomologists in many states, in some instances in cooperation with experiment station entomologists, and also has the cooperation of other federal and state agencies for reporting outbreaks of injurious insects.

Finally, it becomes the duty of all growers to keep a sharper outlook than ever over their crops, to report the first symptoms of insect depredations and to send specimens, in order that no efforts may be omitted to save the crop, and that they may be doing their full share in the "preparedness" program.

E. W. B.

SOME INJURIOUS INSECTS

The whitefly *(Dialeurodes citri)* has received a bad jolt this season over most of the State. The February freeze defoliated the trees, taking the larvae down with the leaves to perish on the ground as the leaves dried out. But let no grower flatter himself that the pest has been eradicated. Hosts other than citrus, such as wild olive *(Osmanthus americanus)*, japonica, privet, etc., carried thru enough for "seed." The larvae were not directly injured by the cold but came thru in good shape on any plant whose leaves did not drop. With plenty of new leaves on which to breed, the third generation of larvae due in August and September, will, doubtless, in many localities become sufficiently abundant to make spraying imperative. Don't waste your money on "cure-alls." Use the parasitic fungi during the rainy season; after that the paraffin oil sprays. See Circular 168, U. S. Bur. Ent. or Bul. 123, Fla. Ag. Exp. Sta.

The Boll Weevil will "hit the trail" for his annual "hike" in August. He will probably get about to Ocala this fall unless someone has given him a "lift" in some cotton seed.

Some scattering specimens of the Fall Army Worm *(Laphygma frugiperda)* have been observed about Gainesville. This may or may not mean an outbreak later. This insect, also called the Southern Grass Worm, attacks especially plants of the grass family. Spray plants with lead arsenate, using two pounds to fifty gallons of water.

In August a pretty, velvety looking caterpillar will probably be found defoliating the vines in many places. It is the Sweet-potato Caterpillar *(Prodenia* Sp.*)*. Spray as for the Fall Army Worm or use the cut-worm bait.

Have you tried the new remedy for chicken lice developed by the U. S. Bur. of Entomology—sodium fluoride? The editor has and reports it to be the best ever. Dust it on the old hen by the "pinch method, i. e., apply a pinch to her head, two to her breast, two to her back, one under each wing, one around the vent, and one under each thigh.

Time to stop up the chimney with a wad of paper to keep out the malaria-carrying mosquito. It is taken for granted that no reader of THE BUGGIST will be foolish enough to live in an unscreened house.

The Velvet-bean Caterpillar has commenced his northward migration. By August he will need attention. Velvet beans are very sensitive to arsenic compounds but by mixing it with air-slacked lime one can dust the vines with lead arsenate. Use a dusting machine; the old bag and pole method does not spread it evenly enough. See Bul. 130, Fla. Ag. Exp. Sta.

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THE SWEET POTATO ROOT WEEVIL IN FLORIDA*

By K. E. Bragdon

The sweet potato root weevil *(Cylas formicarius)* is a little blue and brown beetle about a quarter of an inch in length and closely resembling an ant. The abdomen is of a bright shiny blue color, the thorax and legs are reddish brown, and the head and snout are black.

This insect infests sweet potatoes and similar plants, such as the morning glory. It seems to be particularly fond of the wild morning glory plants which grow along the Florida coast and are commonly known as "sea beans." The eggs are laid on the stems or crowns of the plants. White grubs shortly emerge from these and bore up into the stems or down into the roots or potatoes. After a certain length of time the grubs assume the pupal stage (still white or slightly tinged with yellow) and subsequently become adult beetles with their striking colors.

Since the entire life cycle is passed within the host, and the adult emerges only after complete maturity, it can be readily seen that there is no method of applying remedies in the field that will reach the insect; and that, when it is once once well established, the crop is at its mercy. As this weevil has no mercy, and also has a tendency to raise a large family, it often happens that fifty per cent or more of the potatoes are ruined by the time the farmer is ready to dig them.

However, being an industrious individual, Mr. Weevil is not content with having accomplished this much. The farmer may carefully sort out what appear to be the sound potatoes for his winter's store, but all in vain. It is practically impossible to detect his presence in every potato, and a number that are infested are almost sure to be stored with the sound ones. When

*A revision of a paper read before the May meeting of the Society.

he finds himslf surrounded with an unlimited supply of food that has escaped his ravages in the field this prolific insect immediately sets to work to finish the job. When the good housewife opens the bank or storehouse she finds that Mr. Weevil and his large family have been enjoying the fine pile of provisions so conveniently stacked up for him, and she is exceedingly fortunate if she can find any of the vegetables that are fit for consumption. Should she happen to place an infested potato in the pot or oven by mistake, the one who attempts to eat it will immediately decide that he doesn't want any dinner anyway, and will probably leave the table in a frame of mind similar to the taste in his mouth.

Unfortunately this insect has already been found in eight counties of Florida—Baker, Brevard, St. Lucie, Palm Beach, Broward, Dade, Monroe, and Sanibel and Captiva Islands in Lee. Years ago it was reported in Manatee County, but recent investigations have failed to find any traces of it there. It also infests other Gulf States and the West Indies. In this country it seems to confine its major activities to a belt of about 70 miles from salt water, which would include all of Florida, but outbreaks may occur considerably beyond this belt. Infested shipments of sweet potatoes have been intercepted at Key West and Tampa, coming from Cuba.

In sections where the sweet potato root weevil has become well established, particularly in Florida, it is practically impossible to produce sweet potatoes commercially; and one may consider himself fortunate if he can produce enough for table use.

When we consider the fact that everything in the nature of food is now at a premium, and that the sweet potato is one of the staple food products of this state (particularly for the man of moderate means) we can readily understand how very serious the general dissemination of this pest may become. It is of extreme importance that the further distribution of this insect be stopped NOW, and that some method of exterminating it in the sections already infested be adopted.

Fortunately, the insect does not travel very far of its own volition. It can, however, be sent any distance in infested potatoes, draws or slips. Infested areas should be placed under a strict quarantine; no vines or slips should be moved from these areas under any circumstances; and potatoes which are stored or sold should be fumigated with carbon bisulphide. Care should be taken to store potatoes at some distance from any infested fields, and no potatoes, roots or vines should be left in the fields but should be cleaned up and destroyed. If the growing of sweet potatoes could be entirely abandoned within infested areas for a year or two it is probable that the weevil could be starved out unless morning glory plants were present.

Extreme care should be taken by everyone who contemplates selling or purchasing sweet potato vines for planting. The purchasers should find out from the state authorities (The State Plant Board, Gainesville, Fla.) if the sections from which they expect to make purchases are known to be infested, and should insist that plants be accompanied by certificates of the State Plant Board. Sellers should have their premises inspected by competent inspectors before offering plants for sale. This is a patriotic duty on their part, since they are not only likely to ruin the crops of their customers, but may be the means of materially reducing the food supply of the state and nation in this time of great need.

Recent rulings of the State Plant Board have prohibited the importation from other states and countries of sweet potatoes or vines, and have established quarantines on certain areas within the state known to be infested. Everyone dealing in sweet potatoes should inform themselves of these rulings before making shipments.

Whoever discovers an insect that resembles the description given should immediately send it to the porper authorities *after killing it* in alcohol, gasoline, kerosene, or other similar substance. Complete data as to when and where found should accompany the specimens.

A survey of the State has already been inaugurated by the State authorities, and the Federal government has already decided to take active steps looking towards its control or eradication.

HUMBLE-BEE

Burly, dosing humble-bee,
Where thou art is clime for me.
Let them sail for Porto Rique
Far-off heats through seas to seek
I will follow thee alone,
Thou animated torrid-zone!

(Emerson—The Humble-Bee.)

WHAT THE FLORIDA CITRUS GROWER NEEDS *

By W. W. Yothers,
Bureau of Entomology, Orlando, Fla.

For several years we have wondered why so many of the prominent citrus growers failed to appreciate the full value of insect control. We have visited many growers who have an enviable social standing, superior intellect, and who have amassed more or less wealth, who were not interested in the control of insects on their trees by any artificial means. We must confess that this attitude has dampened our enthusiasm and has therefore hindered us in our work. We have had meetings of the Florida Horticultural Society for 30 years, we have had a State University for many years with short courses and seminars for the dissemination of knowledge, and this laboratory has been located in Orlando for nine years, but for some reason many of the citrus growers have never been reached and know nothing of any researches which have been done in this State. Many of them do know about the researches, but are not interested enough to take action.

More than a year ago we visited a community and the result of this visit gave us our first idea as to the needs of the Florida citrus grower. After eight years residence the idea came to us as to what the trouble might be. We have decided that it is practically useless to talk to the people about some insect or animal which they have never seen and about which they can form no idea as to its appearance, how it gets its living, or what injury it might do. It is equally useless to write learned bulletins on a pest whose appearance the grower has no conception of and knows nothing of its life history or biology. Bulletins of course are all right if a grower knows or understands what he is reading about. We decided more than a year ago that the lack of entomological knowledge was the fundamental difficulty of the growers. Most of them do not know rust mites or their eggs even if they chanced to see them. Neither do they know where they are found, either in the summer or in the winter. They do not know if they have the appearance of an elephant or a monkey. Nor do they understand the appearance of scale insects or the whitefly any better. A great many growers do not know that nearly all the injurious insects

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on citrus insert a beak into the trees for the extraction of juices. Neither do they know what this beak looks like, nor do they know the appearance of the young insects.

About a year ago we visited the foreman of six groves in company with the State Superintendent of these groves. We carried a binocular microscope with us in order to show each foreman the insects present. First a trip was made through the grove and such pests as were present were found and more or less instruction was given in the grove. Samples of these pests were then taken to some convenient place where they were examined under the microscope. An attempt was made to be more or less systematic in presenting this information. We showed them the eggs, young and adults of the most serious pests in their particular grove. No attempt was made to give instruction about insects which were not found in the grove. We also attempted to give instructions regarding beneficial insects, parasites and friendly fungi. Methods for the control of these pests were then discussed as each insect was examined. It would appear that this trip was of great value to the foreman in question, and the superintendent asked me to set apart a week so that the men could come to Orlando for further instruction.

Since this first series of meetings met with such success it was thought advisable to have additional meetings where the growers of a community might take advantage of seeing insects. We held six meetings, all of which were apparently very successful. It was soon found out, however, that such instruction and demonstrations should be accompanied with either a printed or a mimeographed synopsis of the information given. This office has had in mind for some time the preparation of such a course for those people who have spraying demonstrations for this office, but so far nothing has ever been done. These meetings have demonstrated to this office that a laboratory, or a demonstration, or a seminar should be carried to the grower as an individual. We see that our efforts in having the individual come to us have not been entirely satisfactory or successful. It is now up to us to take the results of our researches direct to the grower. This is now being done to a limited extent by the county demonstration agents and we look to them to add a half million dollars annually to the citrus industry.

THE ANOPHELES MOSQUITO IN RELATION TO MALARIA AND AGRICULTURE *

By C. E. Wilson

In considering the recent development, as brought to light, in the past few years on the role of insects as transmitters of disease, I think best to give very briefly a general history of this development.

From all appearances it is natural to suppose that insect transmission of disease has come abruptly into prominence; this, however, is not the facts, for at no time and in no case have great movements or great discoveries been produced suddenly. Centuries ago there was suggested the possibility that insects were associated with the cause of disease and through these early suggestions we have obtained our present knowledge.

Perhaps one of the earliest references to this subject is by an Italian physician, Mercurioles (1530-1607). This was during the period of the plague or "black death." In regard to its transmission he wrote: "There can be no doubt that flies feed on the internal secretions of the diseased and dying, then, flying away, they deposit their excretions on the food of neighboring dwellings, and persons who eat of it are thus infected."

Another of the early writers who deserves consideration is a German Jesuit named Kircher (1658.) He discovered bacteria long before Leeuwenhoek, and to these attributed the cause of disease.

Passing to almost modern times we find in 1848 that Dr. Josiah Nott of Mobile, Ala., published a rather remarkable paper on the cause of yellow fever and malaria, yet his work has been greatly overrated and his theories of mosquitoes, aphids and cotton worms as causative agents were used without the significance of modern science.

In 1853 Beauperthuy, a French physician, discussed the role of mosquitoes in transmission of malaria. In regard to Beauperthuy's work Boyce says: "It is Dr. Beauperthuy whom we must regard as the father of the doctrine of insect-borne disease."

A definite and conclusive mass of argument to support the belief of malaria being transmitted by mosquitoes was brought about in 1883 by an American physician, A. F. A. King, and

*Read before the June meeting of the Florida Entomological Society.

about the same time Dr. Finley of Havana, Cuba, presented his facts in regard to mosquito transmission of yellow fever.

To return to the topic of discussion for this evening, we find as intermediate hosts for the malaria plasmodum, three species of Anopholes mosquitoes, namely: A. crucians, purely southern species; A. quadrimaculatus, a species of general distribution; and the third species causing the transmission is A. punctipennis, which is also of general distribution. These mosquitoes are the agents of transmission for a protozoan blood parasite which causes a breaking down of the red blood corpuscles, and produces a condition commonly termed "chills and fever," or malaria. In favorable conditions these fever attacks occur every 48 hours.

Three principal types of the disease are known. They are: 1, the benign-tertian, caused by *Plasmodium vivax,* which completes its cycle of development every 48 hours, producing the feverish condition. This type is wide spread and common; 2, the quartan fever caused by *Plasmodium malaria,* having a cycle of 72 hours and is more prevalent in temperate and tropical regions, but appears rarely everywhere; 3, sub-tertian or pernicious fever caused by *Plasmodium falciparum.* This is an irregular type of fever and the life cycle of the parasite takes place in the internal organs, principally the spleen, instead of in the peripheral circulation.

Being accustomed, as we are, to malaria in this country, little importance do we place upon it, yet if we should look on the mortality side of the question, the facts no doubt appear astounding. In Italy it causes an average annual mortality of 15,000 out of each 2,000,000 cases. In India it claims annually 1,136,000 persons. In 1911 in Alabama 70,000 cases of malaria were known and of this number 770 cases were fatal.

From my personal observation in South America, and also in the Mississippi Delta region, I should say the figures for Alabama are very conservative.

Having briefly passed over a few of the important facts let us turn back to the life cycle of the *Plasmodium vivax* and see the importance of the mosquito in its development.

In the adult stage *Plasmodium vivax* is found living as an amoeboid, intracellular parasite in the red blood corpuscles of man. In the life cycle two well defined stages are noted; Shizogony (fision), and Sporogony (or spore formation).

(Continued on page 22)

The

FLORIDA BUGGIST

Official Organ of The Florida Entomological Society, Gainesville, Florida.

PROF. J. R. WATSON..Editor
DR. E. W. BERGER...Associate Editor
K. E. BRAGDON..Business Manager

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In this issue we print a very timely article by Mr. W. W. Yothers of the Orlando laboratory of the U. S. Bureau of Entomology. To every citrus grower reading this article it will become plain, we feel confident, that he needs *The Florida Buggist.* He might also attend the Citrus Seminar at the University Oct. 9-12 and the seminar class duirng the preceding week.

During the quarter covered by this number the extra large sweet potato crop of the state will be largely harvested. Especially opportune, therefore, is the article by Mr. Bragdon on the sweet-potato root weevil. Mr. Bragdon has by no means exaggerated the dangerous character of this pest. Indeed we feel that he might have put considerable more "frightfulness" into the article and still been well within the truth. Ever since the discovery of the weevil in one of our chief potato producing counties the seriousness of the situation has been apparent. The history of this infestation should impress upon our readers the importance of promptly reporting to some proper authority the presence of any new crop pest. Altho this weevil has undoubtedly been in Baker County for some years, not until last November when specimens were brought to the Experiment Station was the matter reported to any entomologist.

In this number appears the major portion of a paper read by Mr. C. E. Wilson before the June meeting of the Society. The control of malaria is perhaps the greatest problem before the South today, except of course the trouncing of the Germans. The conservation of human life and health is of vastly more importance than that of wealth. Altho our State has much less malaria than some others it still has too much. The editor has on several occasions gotten himself "in bad" with certain citizens of a "boosting" frame of mind by this line of talk but is still willing to repeat the offense. Indeed to mention malaria in a real estate office is nearly as serious a breach of etiquette as to mention earthquakes in California.

"For every evil under the sun
There is a remedy, or there's none.
If there is one try and find it;
If there is none never mind it."

Now it is not necessary even to try and find the remedy for malaria. It is well known. We need only apply it. Hence the man that adopts the "never mind it" policy is, instead of a real booster, in the end a heavy "knocker," as he hinders and puts off the day of the State's clean up and highest development. He is more foolish than the proverbial ostrich which hides its head so it cannot see the lion. An ostrich squatting on the ground with its head hidden looks like a stone and may escape the lion's notice. But no such "camouflage" will work against Anopheles nor for long against the prospective settler. There are too many posters advertising "chill tonics" on our trees and bridges. While it is true that we may secure almost perfect safety anywhere in Florida by properly screening our houses and staying in them after dark, we have not done our full duty to our communities by retiring behind our screens. Let us keep up the agitation until our neighbors' houses *and our churches* are screened. Many of our citizens are too accustomed to mosquitoes to notice or attach the proper importance to mosquitoes. An amusing illustration of this occurred a few months since. A lecturer was talking on the subject of screens and mosquitoes. A lady in front of us turned to her companion and remarked: "We don't have any screens in our windows and we don't have any mosquitoes," and even as she spoke she was vigorously scratching a collection of typical swellings on her arm.

ANT

While an ant was wandering under the shade of the tree of Phaeton, a drop of amber enveloped the tiny insect; thus she, who in life was disregarded, became precious by death.

(*Martial—Epigrams Bk. VI, Ep. 15.*)

THE ANOPHELES MOSQUITO IN RELATION TO MALARIA AND AGRICULTURE

(Continued from page 19)

This has in a brief way served to illustrate the relation of the mosquito to malaria and so brings us to the second part of the evening's topic, the relation to Agriculture.

Generally speaking, I doubt if this side of the question has scarcely attracted your attention, yet if you stop a moment to consider the enormous losses in crops and waste of uninhabited land due to malaria, the results are amazing.

A beginning along this line was made by Herrick in 1903 when he showed that in the Southern United States the effect of malaria was retarding the development of the country and rendering practically uninhabited some of the most fertile regions of the world, namely, the great Mississippi delta.

A more accurate estimate was made in 1909 when Dr. L. O. Howard placed the annual money loss from malaria in the United States at not less than $100,000,000.

This seemed to cause an awakening of the Bureau of Entomology and as a result Mr. D. L. Van Dine has been stationed for the past few years at Mound, La., and Mr. James K. Thibault, Jr., at Scott, Arkansas. The results of their observations were published in the Southern Medical Journal for March, 1915, and I will briefly give a review of their results.

It is generally known that the Anopheles mosquito larvae thrive best in shallow margins of swamps, ponds, slow moving streams, grass grown springs, and land locked pools, or in other words the abundance of the mosquito in a region is in direct proportion to the extent of water collections.

Malaria, unlike yellow fever, is of rural origin, and decreases in proportion to the decrease of natural collections of surface water; that is as large areas of land have been drained and brought under cultivation, thus destroying the breeding places for the mosquito. Malaria has decreased in direct ratio to the amount of decrease in surface water.

If a map of the United States was made to locate the swamps, undrained lands and lands subject to overflow, you would find that you would also indicate:

(1) Regions known to be malarial;

(2) Areas which include the distribution of one or more species of mosquitoes that transmit malaria;

(3) The most fertile lands in the United States;

(4) Lands which offer the most in crop returns, and are less developed than any agricultural regions of similar extent in the United States.

To show the large amount of acreage that would be included in the above heads I will quote from Senate Document 443, 60th Congress, 1st session. "There are 79,000,000 acres of swamp lands and lands subject ot overflow in the United States, the bulk of which is agricultural land of the greatest potential productiveness. 55,000,000 acres of this land are located within the Southern States, and 24,000,000 acres alone are in the lower Mississippi Valley. These figures do not include 150,000,000 acres of land in the U. S. not classed as swamp land and not subject to overflow, but which are in need of drainage. The larger portion of this immense area also lies in the Southern States."

The place selected for Van Dine's work was the Hecla Plantation, on which the town of Mound, La., is located. This plantation contains 3,500 acres of land; 1,800 acres being in cultivation and 1,700 acres in swamps and timber. The farming is done by negro tenant families, of which there are 74. The crops consist principally of cotton, corn and cowpeas.

The interference of malaria with these tenants amounted to 970 lost days as reported to the physician plus 487 days not reported. This does not include the time lost by persons waiting on the patients, and does not include the cases under 8 years of age. To figure in the amount of time lost by waiting on patients gives a total of 1,842 days lost through malaria. The loss of this labor made an estimated loss in the crop yield for this plantation alone of 487 bales of cotton and 4,035 bushels of corn.

Mr. Thibault's work at Scott, Arkansas, was of very similar nature to Mr. Van Dine's, and the actual time loss and estimated crop loss are in approximately the same ratio, so I will not take up the time to review his results.

BEETLE

O'er folded blooms
    On swirls of musk,
The beetle booms adown the glooms
    And bumps along the dusk.

(*James Whitcomb Riley—The Beetle.*)

PERSONALS

Dr. E. W. Berger, the president of the Society, has recently returned after two weeks spent in Ohio.

Mr. C. E. Wilson, Assistant Entomologist of the State Plant Board, Gainesville, Fla., has resigned and gone to Bloomington, Ind., where he becomes instructor in zoology at the University of Indiana. Mr. Wilson will also do university work towards obtaining the Ph. D. degree.

Mr. W. W. Yothers, of the U. S. Ent. Lab. at Orlando, has been spending several months in Washington, D. C.

Mr. H. L. Dozier, formerly Laboratory Assistant in Entomology at the Experiment Station, who has been holding a temporary appointment with the U. S. Bur. Ent. at Columbia, S. C., has secured a permanent appointment and has been sent to Tempe, Ariz.

Mr. A. C. Mason, also formerly Laboratory Assistant at the Station and later Assistant Entomologist of the Plant Board, who has been in Texas all summer working for the Federal Horticultural Board in their attempt to keep the Pink Bollworm out of the U. S., has been called to the colors.

Dr. H. S. Davis, our vice-president, has returned to the University from Iowa, where he spent his vacation in the laboratory of the U. S. Bureau of Fisheries at Fairport.

A member of our Society, Mr. Kurt F. Innecken, P. O. Box 900, Savannah, Ga., desires to exchange Lepidoptera with some one in Florida, especially in the southern part of the State.

Mr. F. F. Bibby, Assistant Nursery Inspector of the Plant Board, has been transferred to Gainesville as Temporary Assistant in the Department of Enomology, in place of Mr. C. E. Wilson, resigned.

Mr. A. H. Byers, Entomologist, Bur. of Ent., U. S. D. A., was a recent visitor at Gainesville, where he is conducting experiments in cooperation with Prof. J. R. Watson, Entomologist of the Fla. Expt. Station.

The Pink Boll Worm has been discovered at Hearne, Texas. This pest, whose native habitat is probably India, was introduced into Mexico on cotton seed from Egypt, and is now menacing the cotton industry of the U. S. The worm is the caterpillar of a small moth, *Gelechia gossypiella.* Entomologists of the Federal Horticultural Board are making every effort to eradicate the same from Texas before it becomes permanently established.

Aschersonia cubensis, a fungus parasite of scale insects, has recently been found infecting the Magnolia Scale *(Toumeyella liriodendri)* at Gainesville, Fla., and the Palm, or Tessellated Scale *(Eucalymnatus tessellatus)*, on Tabernaemontana, at Oneco, Fla. At the former place the scale has been almost eradicated. This fungus has apparently not previously been identified in Florida although probably quite common.

—E. W. B.

SUMMER MEETINGS

The June Meeting. On the 18th the members met in Dr. Davis' lecture room as usual, but there was such a large number of visitors present, mostly students in the Summer School, that the society adjourned, upon invitation from Dr. Flint, to the Chemical Lecture room. Here Mr. C. E. Wilson gave the paper of the meeting. We print it, in part, in this issue. Mr. Watson exhibited moths of the True Army Worm *(Heliophila unipuncta,* Haw*)*. This is the first definite record of the presence of this insect in Florida. It is surely comparatively rare here altho abundant further north. It should not be confused with the Fall Army Worm *(Laphygma frugiperda)*.

At the meeting of the Society in July, Dr. E. W. Berger gave a lecture, illustrated by lantern slides, on the housefly, setting forth the dangers of this apparently harmless insect to the health of the individual and the community. Its breeding places, such as manure, privies, and masses of decaying filth, should be cleaned up or kept screened to keep off the flies. Kitchens, dining rooms, and places where food is kept should of course be screened.

Because a large number of our members were to be out of the city at that time it was voted to dispense with the August and September meetings.

BEE

The bee is enclosed, and shines preserved, in a tear of the sisters of Phaeton, so that it seems enshrined in its own nectar. It has obtained a worthy reward for its great toils; we may suppose that the bee itself would have desired such a death.

(Martial—Epigrams, Bk. IV, Ep. 32.)

NEW MEMBERS

The following have been elected to membership in our Society since our last issue:

U. C. Zeluff, Deputy Port and Railway Inspector, State Plant Board, Pensacola, Fla.

Fritz Fuchs, Inspector, State Plant Board, Fort Myers, Fla.

Luther Brown, Port and Railway Inspector, State Plant Board, Gainesville, Fla.

W. N. Hull, Deputy Port and Railway Inspector, State Plant Board, Miami, Fla.

James Kerr, Inspector, State Plant Board, Santa Rosa, Fla.

Dr. Hiram Byrd, Scientific Secretary, State Board of Health, Jacksonville, Fla.

Harold Mowry, Inspector, State Plant Board, Santa Rosa, Fla.

C. A. Bass, Inspector, State Plant Board, Fort Myers, Fla.

R. G. Bateman, Inspector, State Plant Board, Fort Myers, Fla.

J. Marcellus Javens, Mount Dora, Fla.

F. F. Bibby, Temporary Assistant, Entomological Department, State Plant Board, Gainesville, Fla.

E. O. Painter Fertilizer Company

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LOWEST TEMPERATURES DURING THE COLD WAVE. ISOTHERMS DRAWN FOR EVERY FIVE DEGREES.

*From U. S. Weather Bureau, Jacksonville, Fla., Feb., 1917.

THE EFFECTS OF THE FREEZE OF FEBRUARY 2-4, 1917 ON THE INSECT PESTS AND MITES ON CITRUS.*

By W. W. YOTHERS, Bureau of Entomology,
Orlando, Florida

WEATHER CONDITIONS AND TEMPERATURES

For more than five weeks prior to February 1st, the weather had been very warm. Many days the temperature reached 85° F., at Orlando, Florida, and on February 1st it reached 86° F., and it was a very sultry, calm day. Between 6 and 8 o'clock p. m., about half an inch of rain fell and there was more or less rain the entire night. The rain was followed immediately by a heavy wind from the northwest, which continued until late Saturday afternoon. It was quite calm, however, Saturday night.

The following minimum temperatures of localities, where examinations were made to determine the conditions of pests, were taken from the U. S. Weather Bureau:

Putnam County, Crescent City	19°F.
Volusia County, DeLand	15°F.
Marion County, Ocala	18°F.
Lake County, Eustis	20°F.
Orange County, Orlando	22°F.
Polk County, Winter Haven	25°F.
Polk County, Frostproof	27°F.
Pinellas County, Pinellas Park	27°F.

The zone of the lowest temperatures, from 15° to 20° F., comprise the citrus producing counties of Putnam, Volusia and Marion, with parts of Lake and Orange. In this zone there was practically complete defoliation of all citrus trees. Many grapefruit trees were killed to the ground and the oranges were killed back to within, from 4 to 8 feet of the ground. Hare in his report on the effects of the freeze† gives the following estimates of the percentage of the bearing wood that had been killed:

	Oranges	Grapefruit
Putnam County	80%	90%
Volusia County	90%	95%
Marion County	75%	85%
Part of Lake County	30%	40%
Part of Orange County	40%	50%

*Published by permission of the Chief of the Bureau. Read before the Florida Entomological Society October 10, 1917.

†Hare, C. C., "Report on Effects of the Freeze." U. S. Bureau of Crop Estimates.

The counties comprising the next warmest zone—temperatures between 20° and 25°F.—with the percentage of bearing wood killed as follows:

	Oranges	Grapefruit
Lake County	30%	40%
Orange County	40%	50%
Osceola County	20%	25%
Polk County	20%	30%
DeSoto County	25%	35%
Manatee County	20%	25%
Lee County	25%	35%

In this group there was about 90 to 95% defoliation of orange trees except in a few protected places. The grapefruit trees were completely defoliated.

The warmest of the three zones—temperatures between 25° and 30°F.—comprises the following counties with the percentage of bearing wood killed:

	Oranges	Grapefruit
Pinellas County	10%	15%
Dade County	5%	10%
Palm Beach County	0%	0%
St. Lucie County	0%	0%
Part Brevard County	15%	20%

The defoliation in this group was not sufficient to influence the number of white flies or other pests to a degree to be of economic importance.

CONDITION OF THE CITRUS TREES AT THE TIME OF THE FREEZE

Owing to the prolonged period of warm weather, citrus trees were in a growing condition. So far as can be determined, the condition of growth was in the same state of advancement in every part of the state. Grapefruit trees, especially, were in the full flush of growth. Orange trees were also growing, and many were in full bloom. Tangerine trees had not reached the advanced state of growth of either the grapefruit or orange trees, but some growth was taking place. Young trees, especially, were growing vigorously. It is due to this condition of growth that the trees were injured so severely. Tangerine trees, being quite dormant, were not damaged very seriously and if other citrus trees had been equally dormant, little damage would have resulted from the cold.

The cold wave not only seriously damaged the citrus and other semi-tropical trees and shrubs, but also it was of the greatest importance in reducing the numbers of injurious pests which infested the trees. Some of these were frozen outright, while others were affected when the plant was defoliated or killed.

THE CITRUS WHITE FLY (*Dialeurodes citri* R. & H.)

It has been known for many years that low temperatures do not kill the citrus white fly. It survives on privet in the temperatures of North Carolina, and the recent cold wave did not injure this species on privet in any section of the State. It is very doubtful if the recent freeze in Florida has directly killed any pupae of the citrus white fly. The defoliation of citrus trees, however, has resulted in reducing the number in many places and localities to the point of almost complete extermination. This is especially true in all the counties of group one. In Putnam and Volusia Counties the only specimens of white fly pupae were found on privet, or in groves that had been fired. In Marion, and parts of Lake and Orange Counties, a few survived, but not sufficient to be of importance for at least a year. This cold has given the white fly such a severe setback in these counties that it will be many years before it will become as abundant as formerly. Examinations made October 3rd still showed this pest to be very scarce in this temperature zone. No spraying has been necessary to control this pest this season. There were a few groves that were fired from which, and the privet, the white fly will re-infest all the groves in the community.

Since there were scattering leaves left on thousands of trees, there were many more of the citrus white fly in the counties of groups 2 than group 1. Probably not more than 1 pupa in 1000 emerged. On October 3rd the white fly was about as abundant as if no freeze had occurred, and much sooty mold appeared on the trees. Many groves should have been sprayed during October and November to control this pest.

In the warmest zone examinations were made only in Pinellas County. Although there was considerable defoliation, it was not of any great importance in reducing the numbers of the white fly. On May 10th there were many groves that needed to be sprayed for this insect. On October 3rd the white fly had blackened many groves. More perhaps were present than at any time since its first appearance in this section.

THE CLOUDY-WINGED WHITE FLY (*Dialeurodes citrifolii* MORGAN).

This species infests only citrus and is found largely on grapefruit. Since the grapefruit suffered such a complete defoliation in the counties of both groups 1 and 2, and a much greater defoliation in group two than oranges, this species of white fly has not been much in evidence since the freeze. It is more than likely that it will be sometime before it again becomes a seriously injurious pest in the counties of groups 1 and 2. In group 3 it was abundant October 3, 1917.

The injured leaves fell from 10 to 14 days after the frost and dried up in the course of a day or two afterwards. Owing to the length of time the freeze occurred before the regular period of emergence of the white flies, none were observed to emerge from the leaves that had fallen. The freeze evidently shows that the white flies are much more resistant to cold that the citrus trees, and were destroyed only in proportion to the extent of the defoliation.

THE PURPLE SCALE (*Lepidosaphes beckii* NEWMAN).

In the counties of group one this pest was almost exterminated. Since practically all the leaves were lost and a majority of the trees had nearly all the branches killed back from three to six feet, there was little chance for the survival of this species. In addition, many were actually frozen. So far as could be observed, the eggs were not frozen sufficiently to prevent them from hatching, so those which were located on the larger branches will hatch and re-infest the trees. A few living females were observed at Crescent City on some old fruit, still on the trees. No living scales other than these were observed in several days' search, from May 3rd to 6th, and again on May 24th. There was considerable scale on some fruits in October. Reports indicate that this scale insect has become fairly abundant in November, 1917.

In the counties of group two, this insect also received a most severe setback, but not to the extent that it did in group one. All insects on the fallen leaves, as well as those on the dead branches, were killed and all young scales frozen. On February 20th an examination of ten fallen leaves, but still green, was made. 150 young scales were dead and one female living. On two dried leaves 2 dead adult females, 1 living adult female and 11 dead young scales were found. If this leaf had been left a day or two longer, the living female would also have been dead. No young scale have been observed up to June on the new growth at any place in this group of counties. The trees, as a whole, are remarkably free from scale, due no doubt, to the effects of the freeze. At the present time (October) this species is quite abundant and not far from normal infestation.

In the warmest of the three groups the defoliation and the mortality, as the result of the freeze, has been the cause of greatly reducing the number of scales, but not to the extent as to make spraying this spring unnecessary. In Pinellas County there were many young scales and crawlers observed on May 10th. On October 3rd, 1917, this pest was most abundant. No indications were present that any had been killed by the frost.

RED SCALE ON CAMPHOR (*Chrysomphalus aonidum* L.).

It was impossible to make observations of this scale on citrus, so the examinations were made where it infested camphor. Since the camphor did not lose its leaves from frost injury, the examination showed how effective the cold had been in freezing the scales instead of killing them by damaging the foliage. On February 7th, or 4 days after the frost, extensive examinations showed that nearly all stages except the eggs had been hurt by the frost. The adult females did not have a normal appearance.

On February 16th examinations of 250 adult females, 11 immature stages and 6 males were dead and 5 adult females and 9 immature stages were living. It was noticeable that more than 25% of the adult females had dead crawlers beneath the scale covering. It was also noticeable that they had died very recently, since they were not dried up at all, but had just turned brown during the previous week. From another tree there were 100 adult females, 60 immature and 14 males killed by the frost, and 5 adult females and 9 immature stages living. Dead crawlers beneath the scale coverings were also present. The two examinations give 94% dead and 6% living. No doubt the percentage of dead was greater since many of the young stages including the crawlers were not counted.

On June 1st there was considerable red scale on the camphor trees from which the leaves were taken for the above examinations. Both on October 3rd and December 2nd as many were present as if no reduction in numbers had taken place.

The frost also killed this scale on privet. On February 17th I found 25 adult females dead and none living. Three of these had eggs with a normal appearance, and one of these three had crawlers. There were not more than 15 eggs with normal appearance and many females had dead crawlers near the opening. On June 1st not a single specimen of red scale could be found on the privets that were examined last spring. On December 12 there are no red scale on these same privets.

When one takes into consideration the mortality suffered by this species on camphor and compares it with the possible mortality it suffered on citrus, from both defoliation and low temperatures, it is very doubtful if more than one insect in ten thousand survived. In fact, it would be nearer the truth to say that not more than one in a hundred thousand survived the cold.

It has been impossible to make observations on this species in group three.

THE RUST MITE (*Eriophyes oleivorus* ASHM.)

At the time of the cold wave there was an abundance of mites present; many more than is ordinarily the case at that season of the year. These were partially frozen and partially killed because the foliage was shed.

Examinations were made at Orlando during the cold wave, on February 3, or after the first cold night, and before the second one. No mites could be found on a small sour tree, located in an exposed situation, on which many thousands had been present all season previous to the frost. On February 7th examinations of green leaves, still on the trees, showed the mites were very scarce compared with the number present before the frost.

The rust mite cannot live on dead fallen leaves. On February 10th green leaves picked up from the ground were examined and no living mites were found. On the same day 17 living mites and three eggs were found on 10 leaves from a tree in a protected location. On 24 green leaves from the trees, 4 living mites were found and from 17 green leaves picked from the ground, 1 living mite was present. No mites were ever found on dry leaves. There is no doubt that the rust mites present on the trees and fruit now are the progeny of those that survived on the leaves uninjured by the frost.

In the counties of group one the mites were nearly exterminated. Those that were not actually frozen perished with the drying of the leaves. In examining six groves, May 3 to 6, in two days only two mites were observed. In a normal infestation there would have been literally billions present. In Marion County, on May 24th, they were also extremely scarce.

In the counties of group two they received a severe setback. A conservative estimate of the mortality would be more than 99%. In fact, on June 1, or more than four months after the frost, they have only become as abundant as they were before the cold wave. Since the freeze the weather has been extremely favorable for the reproduction of the mites, and this pest is so abundant

(Continued on page 38)

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It is the earnest desire of the editors that our members, and especially those outside of Gainesville, should send in brief paragraphs for the Buggist. Nearly every member must run across things that would be of general interest. We desire also any personal items concerning our members or other entomologists who may be in Florida. These notes should reach us by the tenth of the month of publication, March tenth for the next issue.

Please note the 25% increase in size of the Buggist this instar. With the new volume we expect to molt and come out with entirely new headgear.

Aphids, especially Myzus persicae, the Garden Aphid, seem to be more numerous than usual at this time of the year. This is probably due to the unusual amount of damp cold weather during the past month which has checked their parasites and predators.

The colony of Delphastes catalinae, the whitefly-eating ladybeetle introduced from California into a grove near Bradentown by the Station Entomologist, is reported to be spreading at a highly satisfactory and encouraging rate.

A BRANCH OF THE SOCIETY IN FT. MYERS

Altho less than two years old our society is about to have a branch and it is larger than was the parent society at the time of birth. Twelve men in Ft. Myers have formed "The Lee County Entomological Society" and have applied for membership as a branch society. The members are S. B. Walker, Pres.; Fritz Fuchs, Vice-Pres.; Roy Thompson, Secretary and Treasurer; C. A. Bass, R. G. Bateman, W. L. Benedict, F. S. Ballentine, R. G. Oliphant, P. F. Robertson, J. L. Sheldon, A. S. White, all of

Ft. Myers, and A. H. Andrews of Estero. Five of the men have been members of our society for some time and the president is a charter member. Most of the men are connected with the State Plant Board.

The society meets once each week and in addition to other work they are studying Sanderson and Jackson's text book on entomology.

It was the Editor's good fortune to meet with them the last week in October. A more wide-awake and earnest group of men would be hard to find. Men who will spend the whole of a summer day in Florida in a grove looking for citrus canker and then spend the evening studying entomology will be heard from.

May the branch grow as has the parent.

AS OTHERS SEE US

Under the heading "The Florida Entomological Society and Its New Organ," the Entomological News of Philadelphia in its November issue gives a brief notice of our society and The Buggist, concluding with, "No richer field for the cultivation of entomology than the Southeastern States exist, and such a society as that of Florida ought to flourish as the whitefly, the sweet potato root weevil and the Anopheles mosquito which their members discuss in their new journal. May they succeed in eradicating these insect pests and their society and Buggist widen our knowledge for many years to come."

PERSONALS

Our first Secretary-Treasurer, R. N. Wilson, now Agricultural Demonstration Agent for Palm Beach County, who met with a serious automobile accident, is now out again.

Prof. W. S. Blatchley, former State Geologist of Indiana and author of several papers on Florida insects, who addressed us last winter, passed thru Gainesville on November 30 bound for his winter home in Dunedin.

Mr. C. H. Popenoe of the U. S. Bur. Ent., Washington, is now in Florida in connection with extension work on the sweet-potato root weevil in cooperation with the Experiment Station and the State Plant Board.

Dr. E. A. Back, also of the Bureau, was in Gainesville the first of the month making arrangements for an extension entomologist to take up storage insects and especially the corn weevil in cooperation with the University.

Mr. W. W. Yothers of the Orlando Laboratory, U. S. Bur. Ent., was married on December 6 to Miss Ada Bumby of Orlando.

Prof. J. R. Watson while passing through the fair city of Arcadia a few weeks ago had to wait on the E. & W. C. train; not being acquainted in the city, and in order to while away the time, he secured his insect net and decided to collect a few membracids and other insects around town.

Some of the older settlers not being familiar with the work of an entomologist at once reported his actions to the mayor. Mayor Royal while on his way to the scene of action met Sheriff Dishong, and the two officials after viewing the strange actions of the "German Looking Fellow" from a distance decided that something was radically wrong, so he was at once taken into custody. Upon searching his baggage a number of bulletins were found and his identity established. Professor was very angry, but his pardon was begged and he went on his way to Bradentown.—*Correspondent.*

Note:—Lucky for the Professor that he did not have a stray copy of *The Jeffersonian* in his baggage, or that the zealous but uninformed officers did not find his insect-poison bottle.

THE EFFECTS OF THE FREEZE OF FEBRUARY 2-4, 1917 ON THE INSECT PESTS AND MITES ON CITRUS.

(Continued from page 35)

now in nearly every part of this group of counties that spraying should be done if bright fruit is to be obtained. The only result in the reduction of the mites by the freeze has been the postponement of the time of maximum infestation in these counties about a month or six weeks.

In the localities of group three they were also greatly reduced in number but not sufficiently to be of any great economic importance. Spraying had to be resorted to at about the same time as in an ordinary season.

By late July and early August the rust mite had become very abundant. In fact, it is generally believed now, that there were more present than ever before in the history of the citrus industry. On October 3rd, however, the species is very scarce. Several groves were examined the first of October and only a few hundred were found. The almost complete extermination of this species by the freeze and its reproduction to billions in six months is a most remarkable biological fact. According to computation, one mite would have a progeny of about 12 million in about 5½ months, and I believe this is just about what actually took place. We saw many grapefruit with an estimated number of half a million, and this condition was the same over the entire state. The "sands of the sea" or "the stars of heaven" are the only expressions that will enable one to understand how abundant this species actually was the last of July and early August.

RED SPIDERS (*Tetranychus sexmaculatus* McGR.)

No opportunity has been offered to determine the effects of the freeze on this pest. Few were present at the time and few have appeared this season. In fact, they have not been so abundant this season as normal.

THE PURPLE MITE (*Tetranychus citri* McGR.)

So far as could be ascertained, the adults did not appear to have been hurt. The eggs, however, had a very soft and unnatural appearance. Since the freeze this pest has not been very abundant and this is, no doubt, due to the eggs being injured by the cold.

ORANGE APHIDS

The aphids infesting an orange tree before the freeze were dead on February 7th. No eggs were present in the colony. This was the same condition as was observed by Hubbard in 1895.* Since the freeze, however, there have been more aphids on the young sprouts than during any other spring in my recollection. These were soon killed by parasites and predaceous enemies and were of little economic importance.

EFFECT OF THE FREEZE ON THE PESTS OF OTHER PLANTS THAN CITRUS.

Tenuipalpus bioculatus McGR.

This species on privet was slightly, if any, damaged by the cold. Living specimens were found February 17th. These, however, may have been hatched since the cold.

Tetranychus yothersii McGR.

This species on camphor seems to have been very seriously hurt. On February 7th the adults were nearly all dead. Only a few showed any signs of life, such as moving their legs, and only one on the entire lot of leaves was active. The eggs also did not appear to be normal, being soft and easily broken. On February 17th put some camphor leaves, having an abundance of eggs, into

*Hubbard in "Insect Life," Vol. VII, pp. 281, 282.

a tumbler. On March 7th there was only one living mite and the eggs were still red in color, but they were not normal nor had they hatched. They were soft, and when broken contained a liquid instead of a young spider. Another collection of leaves made just after the freeze and examined on February 15th, gave the same results; the eggs did not hatch. On another tree there were many unhatched eggs. On February 17th these appeared to be very soft. On these same leaves there were 13 young mites that had evidently hatched since the freeze. No doubt the adults, young mites and eggs were largely killed when in exposed places.

In fairly well protected spots the adults and young were not killed. On February 29th there were 23 adult females, 8 males and 10 young mites living on a few camphor leaves. The eggs, however, did not appear to be normal. They had that same dull look as the others that never hatched.

The observations on this mite show that all stages are easily affected by the cold, and especially are the eggs damaged, which is contrary to expectations. The adults survive only in protected places. On June 1 there were practically none of this species present, while there are specimens of *Tetranychus sexmaculatus* and *Tetranychus citri.*

NOTES ON SOME INSECTS OF SOUTH FLORIDA IN 1917

By R. N. WILSON

(Paper given before the Florida Entomological Society.)

The above title is somewhat too inclusive, as the observations were made almost entirely in Palm Beach County, tho some were made in other counties.

Dictyophorus reticulatus—The Lubber Grasshopper. These large grasshoppers were very numerous on some of the drained saw-grass lands along the Palm Beach Canal in the Everglades, but because this land has not yet come under cultivation little damage resulted. Along the shores of Lake Okeechobee where severe injury has resulted from their attack during certain years, these grasshoppers were present in small numbers, but were not troublesome. The writer's previous experience with this species at Fellsmere and other points had proved that it could be controlled with the so-called "Kansas Mixture" (bran, paris green, syrup and citrus fruit) even when there was a large influx from surrounding lands. None of the melanic forms were found, as would be expected from the known distribution of the various forms.

Empoasci mali—The "Green Fly." This little jassid or leaf hopper, which is commonly called the "Green Fly," made its appearance very late in the spring, and caused injury only in small areas during the entire summer. This is quite an unusual occurrence since snap beans maturing in March are often severely attacked, and cowpeas may be entirely destroyed during the average summer. The reasons for the scarcity of this jassid during the year are not known, tho many farmers attribute it to the cold in early February. No satisfactory control measures are known, even on truck crops. The promising contraption for catching the leaf hoppers invented by Mr. Oller of Delray is not now in use, because, altho thousands of the insects were caught the numbers remaining in the fields were not perceptibly reduced. On account of its wide range of food plants swarms of this jassid may come in from adjoining lands.

Laphygma frugiperda—The Fall Army Worm. The habits of this insect seem to be slightly different in South Florida than in other parts of the United States, in that altho they are extremely numerous during spring, summer and fall, particularly in corn fields, they rarely assume the "army" habit. There are few of our insects that do more damage than the Fall Army Worm, and the limited acreage of corn on the lower East Coast is not increased because this insect is present. Corn planted in February or early March can mature and escape with only slight injury, but later plantings of corn, other than the Nassau corn and its close relatives which have some immunity, are usually riddled and sometimes even its ensilage value destroyed. Altho some farmers have tried to control the pest with arsenate of lead, few of them have been persistent, and little good has resulted. This species is more often found in the ears and damages them more in South Florida than the common corn ear worm, *Heliothis obsoleta.*

Diabrotica vittata—The Cucumber Beetle. Just how long this species has been in South Florida is uncertain, estimates varying from two to five years, but certainly in that time it has come to be one of our most important insects. These beetles were in the fields in considerable numbers during the freeze in early February, which apparently did not injure them. Altho their principal injury is to cucurbits, sunflowers and other plants are sometimes injured, and during the spring the writer saw them attack the tender foliage of citrus trees in a few localities. They occur on the cucurbits in such swarms that the usual poisons and repellants do not seem effective, but excellent results were obtained this year by frequently covering the plants with cornmeal or flour, and sometimes arsenate of lead was mixed with these. The beetles apparently prefer to eat the meal or flour to eating the plants, and with careful and frequent dusting the plants can be saved.

Chalcodermus aeneus—The Cowpea Pod-Weevil, or Cowpea Curculio. It was with considerable surprise that the writer found heavy infestations of this beetle on the east shore of Lake Okeechobee, because this section has had almost no previous cultivation, and has been absolutely isolated from cultivated areas. This observation probably points to a native food plant on which the beetle has been thriving in that locality. No control measures were attempted in the Lake region and the peas in several fields were a total loss. Along the coast in Palm Beach County little damage by this species was seen or reported.

Phytoptus calacladophora—White Mold. Many farmers believe the moldy appearance caused by the infestation of this mite to be a disease, which is not surprising when we consider that the mite is usually difficult to see with the naked eye. During the year this species became very abundant on tomatoes, and the most interesting point observed was that on muck lands the farmers had little trouble bringing it under control with the sulphur sprays, while on the sandy lands it seemingly could not be stopped by almost continual spraying and caused very severe injury. Farmers report that this is the case to a certain extent every year.

Millipedes. On the shore of Lake Okeechobee where eggplants and peppers were set in the muck lands following the clearing of heavy weeds and brush in August and September they were attacked by millipedes and some injury done. The millipedes did most of their work at night, tho some few could be found on the plants in day time. Upon digging around the plants three to six millipedes could be found in many instances. The damage was most pronounced near the edge of the fields, and investigation showed that there were thousands of the millipedes under the piles of brush. Arsenate of lead was recommended as a control measure, and probably the "Kansas Mixture" broadcasted would be effective.

Negro Bugs. During August and September there was considerable complaint of injury in the Lake Okeechobee region from these small black bugs, which the farmers called beetles. It is certain that large numbers of the bugs were present in the seed beds and in some fields, but the writer is inclined to doubt that they did much damage. Prof. Watson recommended crude carbolic acid used at the rate of a tablespoonful to two gallons of water or a dust made by adding a half pint of the acid to a bushel of lime or plaster, but I do not know what results were obtained.

Tabanids. Among our very worst pests of livestock are the large Tabanids which appear in great numbers for from four to eight weeks in the spring. I have seen even mules covered with bloody splotches caused by the bites of these insects in one day. Work animals are usually protected by repellant mixtures, mechanical means or by screening their quarters, but the unfortunate range animals suffer severely and lose weight considerably during this period. This is a problem to which little attention has been given, and which, in justice to our growing livestock industry, deserves to be attacked with vigor.

BOOK AND BULLETIN NOTICES

The October number of the Quarterly Bulletin of the State Plant Board contains two valuable articles on scale insects. The first on "Some Florida Scale Insects," by C. E. Wilson, lists 83 species, most of which are illustrated by original photographs. This is a very credible list and should be a great help to those working with these insects.

We note under Cottony Cushion Scale, p. 18, many plants listed as not having been found infested in Florida that should have been recorded among the Florida hosts, as they were found infested at Key West (See An. Rep. Fla. Ag. Exp. Sta. 1915 p. lxxiv).

The second article by Dr. E. W. Berger on the control of scale insects is the latest word on the subject.

Press Bul. 285, Fla. Ag. Exp. Sta., is on the San Jose Scale and No. 286 treats of the Boll Weevil in Sea Island cotton.

Farmers' Bul. 875, U. S. D. A., treats of (*Ligyrus*) *Euetheola rugiceps* which the authors, Philip and Fox, call the rough-headed corn stalk-beetle. This beetle is common in Florida but no serious injury to corn seems to have been noted.

Farmers' Bul. 843 on pecan insects is of peculiar interest to us, as it is the result of work done mostly in Florida by J. B. Gill, who is stationed at Monticello.

Bul. 609, U. S. D. A. (Professional Paper), is on *Pilocrocis* *tripunctata,* which the author (T. H. Jones) calls the sweet-potato leaf-folder. This pyralid moth was in October bred out from sweet-potatoes on the Station grounds, where it was working with Prodenia. The point that attracted our attention was that it was not controlled by the Kansas bait as was Prodenia, doubtless because it feeds largely in the rolled up leaves. The damage it did was inconsequential.

"Fleas and Their Control," is the subject of Farmers' Bul. 897, by F. C. Bishopp.

"The Life of the Caterpillar" (Dodd Meade and Co.) has been translated from the works of that delightful French author Fabre, "The Insects' Homer."

REPORTS OF MEETINGS

(K. E. BRAGDON, Secretary)

Science Hall, Gainesville, Fla., Oct. 10, 1917

The meeting was called to order by the President with about seventy members and visitors present.

The report of the Secretary was read and approved.

The executive committee reported on the following names and they were elected as members in the Society:

W. N. Hull, Dept. Port & Ry. Insp., State Plant Board,	Miami, Fla.
James Kerr, Inspector, State Plant Board	Santa Rosa, Fla.
Dr. Hiram Byrd, Scient. Sec'y State Board of Health	Jacksonville, Fla.
Harold Mowry, Inspector, State Plant Board	Santa Rosa, Fla.
Clarence A. Bass, Inspector, State Plant Board	Ft. Myers, Fla.
R. G. Bateman, Inspector, State Plant Board	Groveland, Fla.
C. D. Kime, Co. Dem. Agt., Brevard Co.	Titusville, Fla.
Wm. Gomme, Co. Dem. Agt., Lake Co.	Tavares, Fla.
O. W. Caswell, Co. Dem. Agt., Manatee Co.	Bradentown, Fla.
R. F. Walker	Haines City, Fla.
A. M. Klemm, Nurseryman	Winter Haven, Fla.
Max E. Viertel, Citrus grower	Winter Haven, Fla.
John Adams Comstock	321 S. Hill St., Los Angeles, Cal.
A. W. Street, Citrus grower	Ormond Beach, Fla.
W. N. Crooks, Citrus grower	Viking, Fla.
J. W. Carson, Citrus grower	Frostproof, Fla.
M. B. Allen, Allencroft Nurseries	Mt. Dora, Fla.
Thomas J. Baker, Asst. Nurs. Insp., St. Plant Board	Gainesville, Fla.
James F. Marsh, Inspector, State Plant Board	Groveland, Fla.
S. F. Pool, Citrus grower	Winter Haven, Fla.
M. Marcellus Javens, Citrus grower	Mt. Dora, Fla.
F. F. Bibby, Assistant Entomologist, St. Pl. Bd.	Gainesville, Fla.
F. J. McKinley, Co. Dem. Agt.	Miami, Fla.
Alfred Warren, Co. Dem. Agt.	Ft. Pierce, Fla.
Mrs. Marie Conway Oemler	Savannah, Ga.
L. R. Warner, Asst. Nurs. Insp., State Plant Bd.	Gainesville, Fla.
C. H. Thompson, Citrus grower	Winter Haven, Fla.
J. P. Donnelly, Citrus grower	Mt. Dora, Fla.
A. A. Lewis, County Dem. Agent	Kathleen, Fla.
E. E. Truskett, Citrus grower	Mont Verde, Fla.
Alex Finlay, Citrus grower	Orange Center, Fla.

B. F. Floyd, Agri. Expt. Sta. .... Gainesville, Fla.
C. D. Gunn, County Dem. Agent .... Starke, Fla.
E. G. Gustafson, Citrus grower .... Ft. Pierce, Fla.
T. J. Iles, Citrus grower .... Crescent City, Fla.
E. J. Kaufmann, Citrus grower .... Lakeland, Fla.
Thomas R. Robinson, Inspector, State Plant Board .... Bradentown, Fla.
Robert Ranson, Citrus grower .... St. Augustine, Fla.
A. S. Hooker, Inspector, State Plant Board .... Groveland, Fla.

Mr. W. W. Yothers read a paper on "Effects of the Freeze on Citrus Insects."

Mr. R. N. Wilson gave a talk on "Some Insects of South Florida." General discussion of the points brought out by these two gentlemen followed.

Under "Brief and Timely Notes" Dr. W. A. Wyman mentioned the double strength bordeaux mixture and made a plea that further experiments with this solution be carried out. Dr. E. W. Berger exhibited a specimen of an insect of the genus *Gymnaspis* on *Bilbergia.*

Prof. Watson spoke of the successful use of the "Kansas Mixture" in controlling the Sweet-potato Caterpillar. Mr. J. A. Miller spoke of the milliped attacking the Irish potato. Mr. O. D. Link spoke of a worm affecting the navel orange in Louisiana and of brown beetles boring into oranges where leaves came into contact with them.

Science Hall, Nov. 19, 1917.

The regular monthly meeting of the Florida Entomological Society was called to order at 4:30 p. m. by the President, with the following members present: Wilmon Newell, E. W. Berger, F. M. O'Byrne, J. R. Watson, S. P. Harn, O. T. Stone, F. F. Bibby, J. H. Montgomery, Frank Stirling, L. Russell Warner, H. S. Davis, T. Van Hyning and K. E. Bragdon.

The minutes of the last meeting were read and approved. It was suggested that the students of the University of Florida be invited to attend our meetings and that notice of each monthly meeting and the program be published in the Gainesville Sun.

The matter of a suitable heading for the "Florida Buggist" was discussed and it was voted that this be left to the discretion of the editors.

After a discussion of the matter of our affiliation with the Florida Academy of Sciences, it was voted that the Secretary write to all non-resident active members of the Society and ascertain their views, in order that a vote may be taken at the next meeting to decide whether our society should withdraw as a section of the Florida State Academy of Sciences.

The following new members were elected by acclamation as associate members:

K. S. Lamb, Inspector, State Plant Board	Gainesville, Fla.
O. D. Link	Buras, La.
Wm. L. Drew, Citrus grower	Eagle Lake, Fla.
J. G. Atherton	Lakeland, Fla.
Dr. W. E. A. Wyman, Citrus grower	St. Petersburg, Fla.
Vet L. Brown, Nurseryman	Winter Haven, Fla.
W. Bartlett, Nurseryman	Ft. Ogden, Fla.
H. H. Hume, Nurseryman & Pres. Fla. Hort. Soc.	Glen St. Mary, Fla.
H. A. Wartmann, Inspector, State Plant Board	Citra, Fla.
B. F. Flowers, Inspector, State Plant Board	Sebring, Fla.
John Schlobig, Inspector, State Plant Board	Sebring, Fla.
M. M. Bass, Inspector, State Plant Board	Groveland, Fla.
W. O. Lahrman, Inspector State Plant Board	DeLand, Fla.
O. T. Stone, Clerk, State Plant Board	Gainesville, Fla.
A. L. White, Citrus grower	Ft. Myers, Fla.
C. G. Bishop, Citrus grower	Monticello, Fla.
J. M. Mears, Inspector, State Plant Board	Manatee, Fla.
L. O. Smith, Inspector, State Plant Board	Wauchula, Fla.
H. C. Artis, Inspector, State Plant Board	Wauchula, Fla.
S. E. Cassino, Publisher	Salem, Mass.
C. E. Whittington, Asst. Nurs. Inspector, State Plant Board.	

The Business Manager of "The Florida Buggist" reported that the total receipts for subscriptions, advertisements, etc., to date, amounted to $74.45; that the total expenditure in publishing numbers 1 and 2 and mailing same to members and others amounted to $73.86, leaving a balance of $0.59.

The paper of the evening, entitled "The Spiny Citrus Whitefly in Cuba," was given by Mr. Newell, and was followed by an extended discussion. This paper will be printed elsewhere.

Mr. F. F. Bibby gave a short talk on the distribution of the boll weevil in Florida.

Dr. Berger's article, "Entomology as a Pure Science," was postponed for the next meeting on account of the lateness of the hour.

Under "Brief Timely Notes," Professor Watson reported the following insects:

"Negro Bug," as infesting chufas in various parts of the state.

Epicaerus formidolosus, as infesting beans and being found on cotton and cowpeas, being apparently more abundant this year than usual.

Vaginulus floridanus, a slug on tomatoes, found at Dania, Fla.

The Woolly Whitefly, in St. Lucie County.

K. E. Bragdon reported that the seaside morning-glory was apparently a preferred host plant of the Sweet-potato Root-weevil, since it could be found in this vine when it could not be found in adjacent sweet potato plants.

E. O. Painter Fertilizer Company

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BEE KEEPING IN FLORIDA.*

By FRANK STIRLING

The keepers of bees in Florida find many reasons for engaging in this industry. Some engage in it solely for the honey produced and the financial gains resulting therefrom, while others, in fact a large majority, are in the business for the love of it. For some it is a recreation, and there is none better, as it gives delightful and absorbing occupation in the open air, and those who love natural science find no more fascinating problems than the ones still unsolved in the hive.

As a vocation it requires one's whole time and energy in order to insure success. Florida already has a large number of persons engaged in the bee industry whose yearly incomes vary from $500 to $5000. You will find bee keepers located in most all sections of the State, but most of them are at points where the pasturage for the bees is of the best; that is, where the plants grow which produce the most and best honey, such as the citrus grove sections on the east and west coasts, the swamps where great quantities of cabbage palmetto grow, and the northwestern portions of the State where the tupelo and titi abound. Some bee keepers in Florida have several hundred colonies, but most of them keep only a few as a "side issue". Fifteen or twenty colonies may be managed with comparatively little time and attention, and if proper care be given to such an apiary it will prove profitable. If the season is favorable the product of one colony should net the owner from $4.00 to $10.00. For example, three years ago, from a small apiary of thirty-two colonies, the writer produced one ton of honey which sold at from ten to twenty-five cents per pound. It is not considered an exception for some colonies to produce as much as one hundred pounds of surplus honey during one year.

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*Paper read before the Florida Entomological Society.

Of all the lower animals, bees are the most highly developed in certain ways, especially with regard to the spirit of communism, which is wonderful. One of the most remarkable peculiarities of bees, which is also shared by social insects such as ants, wasps and termites, is that there are three distinct kinds of individuals in the community, for in addition to the males and females which are the reproducing members of the colony, there is a third class which performs the labors of the community. These, commonly known as workers, are really undeveloped queens or unsexed females. In the termites the workers are both females and males.

The queen bee is the acme of a long period of development. She may actually be the mother of all her subjects. Too much care cannot be given to the selection of the queen, or mother bee, of the colony, for her blood is in their blood, her faults their faults, and her weaknesses their weaknesses. The mature or laying queen is a very graceful insect, her body is long and pointed and extends far beyond the tips of her closed wings. It requires about fifteen days for her to emerge from her cell after the egg has been laid. After several days she mates with a drone outside of the hive high up in the air on what is known as the "flight". During her life, which is sometimes less than a month, but generally two or three years, and occasionally more than five years, she mates with a drone only once.

Of all the inmates of the hive, the lot of the drones is the least enviable, for the reason that one only will fulfill the destiny as father of the hive; many are born only to be slain when the honey harvest is low. In appearance, the drone differs much from the queen and the workers. He is broad and the rear end of his body blunt. He is made for a life of idleness, his hind legs bear no pollen baskets, his tongue is so short that he could not reach the nectar inside the blossoms even if he wanted to do so, and he has no wax glands such as the worker has for secreting wax, and he cannot fight his enemies because he has no sting. His only accomplishment is his buzz. He generally lives until the workers decide they cannot afford to keep him any longer. In a queenless colony he may live six months.

In the bee community all the work is carried on by neuters, or unsexed females. The life history of the worker is usually as follows: The cell in which she is developed is the smallest of those composing the honeycomb. In twenty-one days from the time the egg is deposited the worker emerges a fully developed bee ready to do the work of tending the larvae, gathering pollen and nectar from the field, and also acting in the capacity of guardian to the hive. The life of the worker during the busy season is usually about six weeks. However, those born in the late fall live through until the following spring. Very few die in the hive, especially during the busy season, as their wings wear out while flying to and fro and they drop to the ground. They apparently never rest when there is a good flow of nectar from the flowers, for during the day they are engaged in gathering the harvest, and all night long they work in the hive secreting wax, which is necessary to build the honeycomb; and by keeping a constant circulation of air thruout the hive by means of their wings, they evaporate the moisture from the sweetened water, which is known as nectar, until nothing is left but the honey. In other words, while the bees gather nectar, they make the honey.

In these troubled times, when we are all urged to do our "bit" ("best") in the great struggle for universal peace, when the farmer especially is asked to make his acres produce their maximum, there is nothing that can add to the general supply more than almost any kind of sweetening.

The production of honey, bee keeping, has always been quite an industry. Long before the dawn of history honey was used and prized highly as food. This valuable sweet, to the ancients of our race, was a perfectly concentrated sweetening ready for immediate use without any preparation. The first mention of this ready-made sweet in history is in Genesis, fourteen, eleven. "Take of the best fruits in the lands in your vessels, and carry down the man a present, a little balm and a little honey."

One who is well versed in the science of bee keeping, while traveling through the State of Florida, may see the enormous waste of the thousands of acres of flowers of numerous kinds. What I mean is that just about one per cent of the nectar produced by these flowers is being harvested by the honey bees. The census reports but $100,000.00 worth of honey produced annually in Florida, and there could easily be $1,000,000.00 worth produced if enough bees were on the job and handled properly by competent bee keepers.

Wild bees are common and the cutting down of bee trees with their stores of honey is not infrequent. Several years ago I cut down four bee trees during one morning, securing therefrom about one hundred pounds of honey. If bees do so well wild, it is certain that by intelligent effort the honey production here in Florida could be made profitable. In California, where conditions for honey making are no better than here in Florida, in my opinion not nearly so good, there were produced in 1915, 600 car loads, or 15,000,000 pounds.

Most people have the idea that honey can be used only as syrup or in the comb to be eaten raw. Experts in nutrition in the United States Department of Agriculture have gone fully into the subject, and declare that with butter at forty cents a pound, a pound of honey at seventeen cents will be found equally economical as a source of energy. You can get the Department's Bulletin No. 653 entitled "Honey and Its Use in the Home", which is free, by writing to the U. S. Department of Agriculture at Washington. Information can also be secured from Wilmon Newell, Plant Commissioner, Gainesville, Florida, who has had a wide experience in bee culture.

Bees serve a good purpose besides the production of useful food. They are essential to the proper pollination of fruit trees. It is a well known and long established truth that the nectar, odor and bright color of the flowers are simply means of attracting insects in order that the fertilizing pollen may be carried from flower to flower. The honey bee is chief among insects for this purpose. It is the most easily controlled of all insects to do this necessary work.

It is of interest to know that Florida holds the world's honey producing record. In support of this claim I will quote from a report by P. J. Wester, formerly horticulturist of the U. S. D. A. Plant Introduction Station at Miami but now horticulturist of the Philippine Bureau of Agriculture, as follows: "It is worthy of note that the world's record for honey production is held by the sub-tropical state of Florida. The 103 colonies of an apiarist there, known to the writer, averaged about 298 pounds of honey per colony one year, and one produced the astonishing amount of 496 pounds."

The average yield per colony for Florida for 1917 was 86 pounds, which was almost twice the amount per colony produced in most of the other states during the same year. So the man in Florida who has a hive of bees, especially at the present time, is not likely to get "stung".

THYSANOPTERA OF FLORIDA

J. R. WATSON

Agricultural Experiment Station

These insects are usually called thrips. They are all small, the largest measuring about eight millimeters (1/3 in.) in length while the smallest is scarcely half a millimeter. The vast majority are from one to two millimeters long. This is not as great a range in size as is common in other orders of insects. They are slender insects and their bodies are composed of four movable parts—the head, prothoraz, pterothorax (fused meso- and meta-thorax), and abdomen. This mobile structure enables them readily to squeeze into cracks in the bark of trees and into the parts of flowers where most of them live. Moreover the ten joints of the abdomen are loosely articulated so that the abdomen, like that of rove beetles, can be bent up over the back in a threatening manner as if the insect would sting. The real object of the motion is, in most cases, to straighten out the hairs of the wings preparatory to flight.

Each of the four parts of the body bears appendages. On the head are the antennae, always long and slender and composed of from seven to nine segments and capable also of a large range of motion. The comparative lengths of these antennal segments are much used in classifying thrips. On the antennae are hairs and spine-like organs. Some of these are "sense cones", probably organs of smell and perhaps of hearing.

Large compound eyes are present and near them usually three small simple eyes, ocelli. The anterior one of these frequently is directed forward and the others upward.

The mouth parts are of the sucking type and not rasping as is sometimes stated. However, the punctures they make in the tissues attacked are usually numerous and close together, giving to the injured tissues somewhat the appearance of having been rasped away. A peculiar characteristic of the mouth parts is the lack of symmetry between the two sides. The right mandible is entirely missing.

Although some species are wingless, there are usually two pairs of similar wings. Each consists of a long and rather narrow membrane fringed with very long hairs. These hairs are responsible for the name Thysanoptera, "fringe wings". In many species there are from three to twenty or more hairs of a second row present near the end of the front wings.

The body is usually provided with a few stout hairs or spines. These are most numerous towards the end of the abdomen but many species have prominent ones on the angles of the thorax and often a long stout one (post-ocular) some distance behind each eye.

The legs end in peculiar expansile membranes which are responsible for an older name of the order, Physopoda, or "bladder-feet".

There are two quite different types of ovipositors, a long saw and a softer membranous tube. Those thrips having the latter type are placed in the sub-order Tubulifera. Those having the saw in the sub-order Terebrantia and in the family Æolothripidae or Thripidae, according to whether the ovipositor is turned up or down.

This order of insects is most closely related to the true bugs, Hemiptera, and was formerly placed in that order.

HABITS. Most species are plant feeders. They suck the sap from the more tender parts of the plants. Some are predatory on other small insects and mites. One of our Florida species—may his tribe increase—feeds on the eggs and crawlers of white-fly. All thrips are of potential economic importance.

LIFE HISTORY. As a typical life history we may give that of our most common species, the Florida Flower Thrips. The eggs are laid in the tissue of tender plants just below the surface in a shallow slit made by the female. They hatch in about three (2-4) days. The larvae feed and grow for an average of 15 days (the minimum was ten and the maximum 24 days in summer), molting three times. The last immature stage is the pupa. This is peculiar. Like insects with a complete metamorphosis, thrips do not feed during this time and move about but little. But like their relatives, the bugs and other insects with an incomplete metamorphosis, the wing pads are present during this stage. Their development is thus intermediate between the two types. A final molt and the adult appears full-winged and with fully developed reproductive organs. The females feed for about five days and then begin to lay eggs. The completed life history therefore covers about 23 days. This would allow 16 generations per year. But breeding ceases altogether during the coldest weather of our winter and proceeds much more slowly during the entire winter. There is not a month of the year, however, during which breeding is entirely suspended. After a warm spell in even January one can find at least a few young in roses and other favorite flowers. They do not hibernate, but are equiescent during the coldest weather. Further north thrips hibernate in either the adult, egg, or larval stages.

Parthenogenesis is common. Indeed in many species no males have ever been seen.

ENEMIES. Thrips seem to be exceptionally free of predaceous enemies. They are apparently too insignificant to figure in the commissary arrangements of other animals. An internal parasite has been recorded, a hymenopteron, but it is not common. A fungus disease or two have been observed, and a small bug *Triphleps insidiosus,* feeds on them. But the chief factor in keeping down their numbers is heavy dashing rain, which beats them from the plants and pounds them to death on the ground.

This order of insects has been but little studied by resident entomologists of Florida. Mr. A. C. Morgan of the U. S. Bureau of Entomology, has done considerable collecting in the State, aided by Mr. Runner, and has described several species. Mr. J. D. Hood of the U. S. Biological Survey, has described several Florida species.

Prof. A. L. Quaintance and the late H. M. Russell, both of the Bureau of Entomology, have studied some species of economic importance. The writer has collected in this group only incidentally while working on some species injurious to plants of economic importance. The present list includes all the species the writer has collected in the State with the exception of two or three apparently new species of which he has not as yet been able to collect sufficient material for description. There has also been included in this list all the species that have been listed by other collectors as taken in the State. Many of these specimens the writer has not seen, and he assumes no responsibility for the correctness of their identification. But as they have all been listed by careful workers, they are doubtless mostly correctly identified. Those records that have thus been compiled from the publications of others are indicated in the text with the name of the collector and a reference to the publication in which the collections were recorded. When the name of the col-

(Continued on page 65)

The

FLORIDA BUGGIST

Official Organ of The Florida Entomological Society, Gainesville, Florida.

PROF. J. R. WATSON..........Editor
DR. E. W. BERGER..........Associate Editor

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EXTERMINATE THE BOLL WEEVIL

A late number of the Quarterly Bulletin of the State Plant Board bears an editorial of unusual interest to entomologists. In brief the suggestion is to exterminate the boll weevil from the United States by enacting a "no cotton" year. From the entomological side the problem is an easy one. The difficulty is psychological. To tell a man that he cannot raise cotton interferes with his "rights". But, as the Commissioner pointed out, by the time the war is over we will have been so thoroly "Hooverized" and "McAdooized" that we will not think so much of our "rights". The fact that the suggestion comes from the man who has practically "canned" Citrus Canker (seems as if it should be spelled Kanker to link it to other undesirables) will give the suggestion weight. Should a few plants of cotton escape the inspectors and leave a few colonies of the weevils, their extermination will be an easy matter as compared with that of Citrus Canker.

Our members will be glad to read in this issue of the continued prosperity of the Lee County Branch.

NOTES BY THE SECRETARY TREASURER

The annual dues of the Society were raised to one dollar, beginning with 1918, at the March meeting of the Society. This increase was made necessary in order to have a reserve fund available for the publishing of THE BUGGIST, in case other income should at any time prove insufficient. Each issue of THE

BUGGIST costs between twenty-five and thirty-five dollars. It is planned, on the other hand, to enlarge each issue as funds become available.

It is therefore urged that all members who have not already done so, be so kind as to send in their dues at once. In order to save postage and thereby to conserve the funds of the Society for use in publishing THE BUGGIST, personal notices for the annual dues will not be sent except when necessary. Please do not make this necessary in your case but send your dollar before you forget it. Receipts for dues will also generally not be mailed, but will be acknowledged in the next number of THE BUGGIST.

New members will also be notified of their election in THE BUGGIST under Reports of Meetings.

The Secretary-Treasurer also wishes to urge upon all members to miss no opportunity to obtain new members, and upon all others who read this notice and are interested in "bugs" to become members.

The Executive Committee has designated the Curator of the University Museum as Custodian for publications received in exchange and otherwise.

REPORTS OF MEETINGS

(All meetings are held in Dr. Davis' Lecture Room, Science Hall, University of Florida, from 4:30 to 6:00 p. m., unless otherwise stated.)

At the meeting of December 17, 1917, a communication from Mr. Roy Thompson, Secretary of the Lee County Entomological Society, was read. In this letter application was made for accepting this Society as a branch of the Florida Entomological Society. As the constitution would need amendment to provide for such affiliations, the Executive Committee was instructed to draw up the proper amendment.

The following new members were elected: C. E. Whittington, W. L. Benedict, J. L. Shelton, P. F. Robertson, R. G. Oliphant, Roy Thompson, A. H. Andrews and F. S. Balentine.

The paper of the evening, "Entomology as a Pure Science", was read by E. W. Berger. It was the aim of this paper to show that all modern scientific achievements had their beginnings in pure science, or the investigation of natural phenomena for the sake of learning, understanding them as such regardless of what the practical bearing might be. This is also true of entomology, and for that reason the investigation and study of insects as such, regardless of their injury or usefulness, should not be lost sight of. It is planned to publish this paper in a future number of THE BUGGIST.

At the meeting of Jan. 28, 1918, the Executive Committee, in pursuance of instructions received at the December meeting, recommended the following amendment to the Constitution of the Florida Entomological Society. This amendment was adopted by vote of the Society:

> Article 9.—Ten or more members resident in any locality, or having a common interest in Entomology, subject to the approval of the Executive Committee, may form a branch of the Florida Entomological Society. Branches shall have the power to perfect their organization, hold meetings, and in general have full control over their affairs, providing they conform to the constitution and regulations of the Society. All members of branches must be included in the membership of the Society.

It was further voted, upon recommendation by the Executive Committee, that the Lee County Entomological Society be accepted as a branch of this Society. A list of the members of this branch was published in the winter number.

The following officers were elected for the ensuing year: President, Dr. H. S. Davis; Vice-President, F. M. O'Byrne; Secretary-Treasurer, E. W. Berger; member of Executive Sommittee, Dr. J. H. Montgomery.

The following were re-elected on the Editorial Staff of THE BUGGIST: Editor, J. R. Watson; Associate Editor, E. W. Berger; Business Manager, K. E. Bragdon.

It was voted that, at the end of a year, those not having paid their dues for the preceding year be notified, and if they do not pay, be automatically dropt from the membership of the Society.

It was voted that instead of notifying non-resident members of each meeting, the Executive Committee prepare programs three months in advance and publish them in THE BUGGIST.

Mrs. E. G. Rose of Wauchula, and O. K. Courtenay of Gainesville, were unanimously elected as members of the Society.

Under "Timely Notes", Professor J. R. Watson showed beetles of the Family Brenthidae occurring in South Florida. These are close relatives of *Cylas formicarius,* the Sweet Potato Root Weevil.

This being the date for the annual election of officers, the principal paper of the evening was omitted.

At the meeting of February 26th, Prof. John Schaffner of O. S. University, Columbus, O., and Mr. Frank Steffen of Emporia, Kan., were present as visitors.

It was voted to hereafter hold the regular monthly meetings of the Society on the fourth Monday of each month instead of the third, it having become apparent that there would generally be less routine work at that time to keep resident members from attending.

The following new members were elected: Geo. G. Ainslee, Knoxville, Tenn., Entomologist Bureau of Entomology, U. S. D. A.; R. L. Clute, Extension Entomologist Stored Products, Insects, Gainesville, Fla.; W. Knaus, Editor and Manager, the *Democrat-Opinion,* McPherson, Kansas; M. V. Millington, Tampa; John A. Clinger, Tampa; and Jesse F. Taylor, Seffner, Fla.

Under "Timely Notes", Mr. K. E. Bragdon showed specimens and reported on the finding of the Banana Root Weevil *(Cosmopolites sordidus)* at Larkin, Fla. This is the first record of its occurrence in Florida, and the infestation is believed to have been eradicated. E. W. Berger briefly reported on the Avocado Weevil *(Heilipus lauri)* and showed specimens. Altho this insect is not known to occur in Florida, the possibility of its introduction from Mexico and Central America is dreaded and the Port and Railway Inspectors of the Plant Board are keeping a keen lookout for it.——Prof. J. R. Watson reported seeing two more specimens of the Mourning Cloak Butterfly *(Vanessa antiopa)* near Gainesville in February, having previously reported collecting a specimen in January, 1917.

The paper of the evening, "Insect Photography," was read by Dr. H. S. Davis and discussed by those present. Dr. Davis explained the use of colored screens interposed before the object to be photographed. The purpose of these screens is twofold: (1) to intensify certain colors and to subdue others, in order to bring out their relative values as they appear to the eye; (2) to eliminate certain colors altogether. This is necessary because photographic plates are not equally sensitive to all colors. A yellowish or light brown color, for instance, will ordinarily photograph black, but by interposing a screen of that color, and giving a longer exposure, its proper value will be given in the photograph. However, to use screens successfully, plates sensitive to several colors, or all colors, are necessary, such as Ortho, Iso, and others. The use of the new Pan-chromatic plates, sensitive to all colors, was explained and illustrated by a diagram of the spectrum. That the slower plates give better results for photographing specimens in the laboratory than the very rapid ones so generally used, was also emphasized.

March 25. It was voted to increase the annual dues of the Society from 50 cents to $1.00, beginning with 1918. Of all members who voted, non-resident as well as resident, only one non-resident member voted against the increase.

Under "Timely Notes" Mr. Frank Stirling reported on the rearing of 20 Tachina Flies from the caterpillar of a tiger moth collected at Gainesville. He also reported collecting the grubs and adults of a 11-lined beetle *(Leptinotarsa undecimlineata)* feeding on wild eggplant at Havana, Cuba, in January, 1918. This beetle is a close relative of the Colorado Potato Beetle *(Leptinotarsa decimlineata)*, so common in the north and also occurring in the northern tier of counties of Florida.—— Messrs. Dozier and Van Hyning reported obtaining some nematode worms from katydids.

The paper of the evening, "Ecology of Hammock Insects," was read by Mr. Dozier. The discussion was led by Prof. Watson, followed by others present.

The Society adjourned at 6 p. m.

April 29. Visitors present were Prof. C. L. Willoughby of the University and Mr. Leland of the University Farm.

It was voted to sever the Society's connection as a section of the Florida Academy of Sciences and continue as an independent organization.

The principal speaker of the evening being absent, Mr. A. L. Swanson was requested to give a brief account of the inspection of the Florida Keys for the Plant Board. Mr. Swanson stated that he and his crew lived on a house-boat and that the inspection was made between January 8 and April 19, 1918, extending from Elliott's Key, on the north, to Key West. Mr. Swanson further stated that the growth on the Keys is mostly hardwood, including the Gumbo-Limbo. Most of the land is cut-over and the largest trees measure 12 to 18 inches in diameter. The larger insects appeared to be absent, at least at this time. Cabbage butterflies and the Orange Dog were seen, the latter in January at Key West, the insect fauna has many representatives from the West Indies. Many plantings of cotton, etc., were seen without a blemish, being absolutely free from insects and diseases, a condition he had never seen before.

Under "Timely Notes" Mr. O'Byrne reported that birds appeared to get many of the cutworms in his garden; or did wasps get them?——E. W. Berger reported that the whitefly was becoming unusually severe in the citrus groves, due to the fact that the trees had not been defoliated by the last winter's freezes.

May 27. At this meeting Prof. W. L. Floyd, of the University, and Mr. Geo. B. Merrill were present as visitors.

The following new members were unanimously elected: Mr. B. L. Boyden, Scientific Assistant, Bureau of Entomology, stationed in Florida on the Sweet Potato Weevil work; Mr. J. E. Graf, Bureau of Entomology, in charge of Sweet Potato Weevil work in the Southern States; and Mr. Geo. B. Merrill, Deputy Port and Railway Inspector for the Plant Board.

Under "Timely Notes" Mr. Stirling described an infestation of Cottony Cushion Scale, near Sarasota, as the worst he had ever seen. Groves that were infested last year now had but small amounts of scale, with indications that the Vedalia cleaned it up.——Prof. Watson exhibited specimens of the Broad-nosed Grain Weevil, collected at Plant City by E. A. Back, of the Bureau of Entomology, in corn. He also referred to the occurrence of this same weevil as severely infesting dasheens at

Brooksville, the dasheens having been stored near some corn severely infested.——E. W. Berger reported an early and unprecedented demand for the Red Aschersonia, or Red Whitefly Fungus.——Prof. Carl J. Drake briefly discussed a new species of Lacebug (tingid) and showed specimens. He also briefly reported on some of the parasites of the Green Pumpkin Bug.

The principal paper of the evening was by Prof. Carl J. Drake, of Syracuse University, N. Y., on "Water Hemiptera" (Water Bugs). Prof. Drake showed a number of live specimens and gave brief accounts of their habits. He stated that, while these insects are not generally of economic importance, some feed on fish and are therefore injurious to the food supply. In species of Belostoma, the Electric Light Bugs, the male carries the eggs of the female on his back.

The second paper of the evening was by Mr. K. E. Bragdon on "*Euscepes porcellus*", a snout beetle very similar to *Euscepes batatae*, the West Indian Sweet Potato Weevil. In his search for the latter near Moor Haven, he found the former infesting the Moon Vine, a morning glory. Porcellus has been reported as injuring sweet potatoes in Jamaica but not known to do so in Florida. Batatae is not known to occur in Florida.

NOTES FROM THE LEE COUNTY ENTOMOLOGICAL SOCIETY

(Branch of the Florida Entomological Society)

During the past quarter the Lee County Entomological Society has held its regular weekly meetings on Tuesday evenings. During the early part of the quarter the society had as its guest Dr. J. H. Montgomery, who gave a very interesting and helpful talk on the Spiny Citrus Whitefly *(Aleurocanthus woglumi,* Ashby).

On Thursday evening, Jan. 17th, W. L. Benedict treated the society to a stag dinner at the Hotel Elton. The affair was given in honor of R. G. Oliphant, who was shortly to leave on an inspection tour of the Florida Keys conducted by the State Plant Board.

Stanley Millege has been transferred to Citra, Fla., where he will continue his work as inspector for the State Plant Board.

At the February 5th meeting the present officers were re-elected to serve during the coming quarter. The officers are: Shirley B. Walker, Pres.; Fritz Fuchs, Vice-Pres.; Roy Thompson, Sec-Treas.

The return of Fritz Fuchs to his home at Redland, Fla., is viewed with deepest regret by all who knew him. Mr. Fuchs was a hard and enthusiastic worker and his departure is a distinct loss to the society.

Orange aphids are unusually abundant in the vicinity of Fort Myers this spring and we may look for some little damage on their account.

The orange sharpshooter is also causing some damage here.

PERSONALS

Mr. C. E. Wilson, formerly Assistant Entomologist to the Plant Board, has been appointed Neural Histologist in the Brain Surgery Department, U. S. A. Medical Corps. He will be engaged in research work in France.

Mr. A. C. Mason, formerly connected with the Station and Plant Board, is now in the U. S. Army Hospital Service.

Mr. K. E. Bragdon, who has done such valuable work for the Society as Secretary-Treasurer and for THE BUGGLST as Business Manager, has been obliged on account of his official duties to resign both positions. It is largely this that is responsible for the delay in publishing THE BUGGIST.

Prof. Carl J. Drake, Associate Professor in Entomology in the School of Forestry of Syracuse University, has been employed for the summer to assist in the Entomological Department of the Experiment Station. He is working on the life history of the Southern Green Stink Bug or "Pumpkin Bug" *(Nezara viridula)*.

Among the welcome additions to entomologists of Gainesville is Prof. Fatig, who has come from Dakota to take charge of the work of the State agricultural schools. He has a large collection of hymenoptera and diptera.

Luther Brown, agent State Plant Board, enlisted in the U. S. Navy Hospital Service on March 18.

A. C. Brown, agent State Plant Board, enlisted in the National Army on April 4th.

F. F. Bibby, Assistant Entomologist State Plant Board, enlisted in the U. S. Naval Hospital Service on April 10th.

Wilmon Newell, State Plant Commissioner, Gainesville, Fla., is State Leader of the Sweet Potato Root Weevil Control and Eradication Work.

J. E. Graf, of the Bureau of Entomology, U. S. D. A., is in charge of the Sweet Potato Root Weevil Work for the South.

O. K. Courtenay, U. S. Bureau of Entomology, is Field Agent in charge of the Sweet Potato Root Weevil Control and Eradication Work.

K. E. Bragdon, Deputy Port and Railway Inspector, State Plant Board, is Acting Field Agent in the Sweet Potato Root Weevil Control and Eradication Work.

H. L. Dozier, Entomological Assistant at the Experiment Station, has enlisted in the Hospital Service of our country.

Mr. R. N. Wilson, until recently Farm Demonstration Agent of Palm Beach County, has accepted a similar position in Riverside County, Calif. Florida has lost a good scientist and a valuable citizen.

Dr. E. A. Back, In Charge of Stored Products Insects, and Mr. Walton, In Charge of Cereal and Forage Crops, both of the Bureau of Entomology, were recent visitors to the State.

Mr. Thomas H. Jones, Agent of the Bureau of Entomology, was recently in Florida looking over the ground with a view to establishing a substation for the investigation of truck crop insects.

BULLETIN NOTICES

"The Silverfish," by E. A. Bach, Farmers' Bulletin 902, will interest everyone who owns a book in Florida.

A 100-page bulletin on Citrus Insects, a companion piece to the bulletin on Truck Crop Insects, has been published by the Experiment Station.

THYSANOPTERA OF FLORIDA

(Continued from page 55)

lector is not indicated, the collection and identification are those of the writer.

This should be considered as preeminently only a preliminary list and by no means complete. It is thought, however, that it includes all species that have been recorded in entomological literature as occurring in the State. The only locality in which the writer has done systematic collecting is that about Gainesville, and even this small area is by no means exhausted.

Nevertheless the list contains more than four times as many species as Smith lists in his "Insects of New Jersey". When one considers that in most orders of insects the New Jersey list is much larger than the corresponding one of Florida (not because New Jersey has more species but because it has been more thoroly worked than Florida), it becomes evident that Florida is rich both in species and individuals as compared with states further north.

In addition to notes on the distribution, food plants, season, and habits of our Florida species, this list contains keys to the species in general to which the author has added new species. This seems desirable because no adequate keys are in existence. These keys have in most cases been modified from those of other authors and unless otherwise indicated from Moulton (1911). There has been appended bibliography of those works found most useful in the study of our Florida species and all papers in which Florida captures have been recorded. Any one wishing to identify our species for himself should be able to do this by means of this list and Moulton's work (see bibliography, Moulton, 1911).

FAMILY AEOLOTHRIPIDAE

1. *Æolothrips floridensis* Watson. (Watson, 1916.)
   Gainesville, April 1913, on oats. Mar., 1915, on oats and corn. A comparatively rare species has been taken a few times on oats and corn always associated with the next species.
2. *Æolothrips bicolor* Hinds. (Hinds, '02.) THE BLACK AND WHITE CEREAL THRIPS.
   Quincy, 1915, on oats (Hooker, '07); March, '09, collected by H. F. Wilson on *Plantago virginica*, corn, onions (Morgan, '13); May 14, 1909, on rutabaga (Morgan, '13).
   Gainesville, April 23, 1914, on oats; Mar., 1915, on strawberries and citrus.

This is our common cereal thrips and is often abundant on oats in the spring and damages them materially.

3. *Franklinothrips vespiformis* (Crawford). (Crawford, '09.)
Orlando, late February to summer on leaves of citrus. *(Æolothrips vespiformis* Back, '12.)

FAMILY THRIPIDAE

4. *Thrips quinciensis* Morgan. (Morgan, '13.) THE QUINCY THRIPS.
Quincy, collected by A. C. Morgan and G. A. Runner on *Pinckneya pubens* Mx.

5. *Thrips spinosus* Morgan, (Morgan, 13.) THE MAGNOLIA THRIPS.
Quincy, May 1910. Collected by A. C. Mason and G. A. Runner in blossoms of *Magnolia grandiflora.*
Gainesville, May 1915-17, in blossoms of *Magnolia grandiflora.*
This thrips may be found quite abundantly in practically all Magnolia blooms and has been found nowhere else.

6. *Thrips tabaci* Lindeman. (Redescribed by Hinds, '02, p. 179.) THE ONION THRIPS.
Lake City, 1897-8. On onions, cabbage, cauliflower, and crabgrass *(Panicum sanguinale).* (Quaintance, '98.)
Gainesville, Nov.-June, on onions.
Generally distributed, probably in every onion field in the State, and does great damage every year. It is the most serious enemy of onions in the State. Affected onions are characterized by white blanched and dying tips. For remedies see Bull. 134, Fla. Ag. Exp. Sta. Cosmopolitan in its distribution.

7. *Thrips abdomalis* Crawford. (Crawford, '10, p. 157.)
Quincy, March '09. Collected from tobacco by H. F. Wilson; May 17, 1910, on *Senecio* by G. A. Runner and A. C. Morgan. (Morgan, '13.)
Key West, April 23, 1912. "Miscellaneous collecting" by G. A. Runner and A. C. Morgan. (Morgan, '13.)
Gainesville, Oct.-Nov., 1913, on *Solidago* and other composites.
Extends north to Maryland and Illinois, and west to Mexico.

8. *Plesiothrips perplexus* (Beach). (Beach, '95.) *(Thrips perplexus,* Hinds, '02.)
Quincy, Sept. 8, 1909, on grass. (Morgan ,'13.)
Extends north to Maryland and Iowa, and west to Texas.

9. *Heliothrips haemorrhodalis* Bouche. (Redescribed by Hinds, '02.) THE GREENHOUSE THRIPS.
Miami, Sept. 1915; 1908, collected by P. J. Webster on mango and avocado. (Russell, '09.)
Orlando, on foliage of *Acer rubrum.* (Black, '12.)
Gainesville, Jan. 28, 1913, in a greenhouse; May 1917, very destructive to *Coleus* out of doors.
In the northern states this insect is confined to greenhouses, hence the name. But in Florida it is common about gardens and ornamentals out of doors.

10. *Heliothrips rubrocinctus* (Giard). (Russell, '12.) THE RED-BANDED THRIPS. *(Physophus rubrocinctus,* Giard, '01, p. 263.)
Miami, collected in 1908 on mango *(Magnifera indica)* and avocado *(Persea gratissima)* by P. J. Webster (Russell, '12), Dec. 1914. July 1914, on mango.
This insect, introduced from the West Indies, is now abundant on mangoes about Miami, Ft. Myers (Dr. E. W. Berger) Frostproof and West Palm Beach.
It is a severe pest and causes the leaves to loose their color and ultimately to fall.

11. *Echinothrips americana* Morgan (Morgan, '13, p. 16.) THE SPINY THRIPS.
Quincy, Sept. '09 on *Magnolia grandiflora* and "Coffee Bean"; May 18, 1910, on Pokeweed. (Morgan, '13.)
Extends north to Missouri and Maryland.

12. *Limothrips cerealium* Haliday, '82. (Redescribed by Hinds, '02, p. 139.) (L. avena, Hinds.) THE CEREAL THRIPS.
Quincy, May '10, on oats. (Morgan, '13.)
Extends north to Massachusetts and Illinois; west to Texas and Kansas. In Europe also.

13. *Chirothrips crassus* Hinds '02.
Quincy, Oct. and Nov. 1915. (Hooker, 1907.)

14. *Chirothrips manicatus* Haliday ('76). (Redescribed by Hinds, '02 p. 134.)
Quincy, collected on oats on March 20, 1909, by H. F. Wilson. (Morgan, '13.)
Extends north to Massachusetts and Iowa; Oregon and British Columbia; Europe.

15. *Scolothrips 6-maculatus* Pergande ('91.) THE RED-SPIDER HUNTER.
Orlando, spring of 1909. "Found feeding on red-spiders on citrus and several weeds." (Back, '12.)
Winter Haven, April 1916. (Dr. E. W. Berger, Coll.)
Extends north to New York and Missouri and Wisconsin; Hawaiian Islands.

16. *Aleurodothrips fasciapennis* Franklin. THE WHITEFLY THRIPS.
Orlando, March and fall of 1909. (Back, '12.)
Gainesville, Oct. 2, 1912, on citrus leaves.
Feeds on whiteflies but is too scarce to be of much importance.

17. *Odontothrips phaleratus* (Haliday). *(Thrips phalerata,* Haliday.)
Quincy, on *Plantago virginica,* H. F. Wilson. (Morgan, '13.)

18. *Frankliniella fusca* (Hinds). *(Euthrips fuscus.* (Hinds, '02.) THE TOBACCO THRIPS. *(Enicotianae* Hinds, '05.)
Quincy, on tobacco 1905 (Hooker, '07); March 1909, on *Plantago virginiana,* tobacco and life-everlasting, H. F. Wilson collector; May, on peanuts and sorrel. (Morgan, '13.) Tobacco, cocklebur *(Xanthium glabratum),* dewberry, mustard and shepherd's purse. (Chittenden, '04).
Gainesville, April 23, 1914, on oats; Feb. 4, 1915, on turnips. March 1915, on strawberries.

Extends west to Texas; north to Massachusetts and Michigan and South Dakota. A common pest of tobacco.

In the original description Hinds states that the ocelli are smaller than the facets of the eyes. While this is true in many of the specimens collected at Gainesville, in others the ocelli are larger. This character is variable as is also the color and the presence of wings.

19. *Frankliniella floridana* n. sp.

FEMALE, *Measurements.* Total length 0.7 mm. Head, length 0.09 mm., width 0.13 mm.; prothorax, length 0.07 mm., width 0.17 mm.; mesothorax 0.19 mm wide; width of abdomen in widest place 0.20 mm.; antennae, segment 1, 21; 2, 29; 3, 37; 4, 40; 5, 36; 6, 45; 7, 11; 8, 13 microns.

Color of the body bright yellow with brown blotches in center of thorax. The posterior margins of the first abdominal segments very dark, forming five narrow conspicuous bands across the dorsal surface.

Head pale yellowish gray with a darker area about the ocelli; deeply retracted into the prothorax; anterior margin slightly rounded, bearing two moderately long and thick but pale spines, similar but smaller spines along the sides.

Eyes large, not protruding, deep red. Ocelli large, posterior pair separated from the eyes by more than the width of the ocelli; orange yellow bordered and nearly surrounded by deep orange crescents which are wider than the ocelli. These crescents are separated from each other by a space narrower than the crescents. *Mouth cone* long, narrow, reaching entirely across the prothorax. *Antennae* inserted so far below the margin of the head as to completely hide the first segment. First and second segments, all but the extreme apex and base of the third, and the basal halves of the fourth and fifth grayish yellow, a little lighter than the head, remainder dark brown, giving the antennae a distinctly ringed appearance. Spines on the basal portion few but moderately long, thick and heavy, dark colored. On the apical portion they are more numerous but pale, short and inconspicuous.

Prothorax oblong-oval in outline, anterior margin slightly and the sides markedly convex, surface obscurely reticulated, a large triangle in the center conspicuously outlined in dark brown, destitute of conspicuous spines.

Mesothorax widest, with sides and anterior margin strongly convex.

Metathorax with straight sides but diverging sharply posteriorly.

Legs moderately long and slender, yellowish-gray with the tarsi and a large spot on the femora brown.

Wings light gray with two dark bands across the basal third, 19 spines on the fore veins and 22 on hind; dark, thick, heavy; four near the base of the fore vein short, others long. Hairs on the margins long but few in number.

Abdomen short; sides of the anterior portion, first five segments, arched, of the remainder straight and sharply converging. Anteriorly the spines are short and inconspicuous, posteriorly rather short but heavy.

Described from several specimens taken from velvet beans *(Stizilobium)*, Gainesville, Fla., July 1918. Type in the author's collection. Male not seen.

This species is about the size of the California species *F. minutus* as given in the original description, but differs markedly in color, position of the posterior ocelli, length of the mouth cone, and other characters. It is a very distinct species.

20. *Frankliniella occidentalis* (Pergande.) (Redescribed by Hinds, '02, p. 152).
    (Euthrips occidentalis Pergande, '91).
    Dade City, May 12, 1910, on beans, collected by Hunter and Morgan. (Morgan, '13).
    Manatee, March 1911, on mango, H. F. Schultz, collector. (Morgan, '13.)

21. *Frankliniella stylosa* Hood.
    (Euthrips floridensis Morgan, '13, p. 5).
    Quincy, on *Asclepias variegata* L and in blossoms of *Catalpa catalpa.* Morgan, '13.
    Extends north to Maryland.

22. *Frankliniella bispinosus* (Morgan, '13.) THE 2-SPINED FLOWER THRIPS.
    Described from Dade City where it was taken in blooms of *Yucca,* May 1910.
    Gainesville on oats, April '14; roses, April 1912; blooms of compositae, Oct. 1913.
    Miami, April 1916, on avocado blooms which it severely damages.

23. *Frankliniella bispinosus projectus* Watson (Watson, '15.) THE FLORIDA FLOWER THRIPS.
    Gainesville, has been taken every month in the year in roses, and could be taken almost any day and in a great variety of blossoms, but mostly in those of an open structure. Our most common thrips. Begonia (Nov.), tomatoes (March-May), compositae (Oct.-Dec.), *Aesculus pavia* (Mar.), peaches (Jan.-Mar.), *Persea* (March), peas (April), petunias, roses, *Cornus floridensis,* wild plum (Feb.), *Cercis canadensis* (Feb.), cherry laurel (Feb.), citrus; Ft. Ogden, citrus; Gulfport, on sea grape *(Cocolobus floridana)* Oct. 1913; Dania, Ft. Lauderdale and Pompano, on tomatoes, Feb. 1913, White City.
    Not usually found in blossoms with a tube but the petunia is an exception. Prefers light colored, white or yellow blossoms.
    Certainly most and probably all, the insects that have been mentioned in the Florida literature as *Euthrips tritici* belong to this or the preceding variety. The writer has not seen typical *Euthrips tritici* from Florida, but has collected it as far south as Swannanoa, N. C., and has it from Atlanta, Ga., and Alvin, Texas. It is at once told from either of the above varieties by the second segment of the antennae which is asymmetrical. In both of the varieties there are on the dorsal surface of this segment, two prominent spines. In var. *projectus* in addition this segment is prolonged anteriorally on the dorsal side so as to project over the third segment. This is particularly marked in the male. In the female the segment is, in addition, very long.

24. *Bregmatothrips gracilis* Hood & Williams ('15).
    Orlando, Nov. 5 and 8, 1914, C. B. Williams, collector.

25. *Pseudothrips inequalis* Beach ('96). (Redescribed by Hinds, '02, p. 146.)
    Quincy, May 17, 1910, on *Senecio*. (Morgan, 13.)
    Gainesville, Nov. 1913, on wild Begonia.
    Extends north to Maryland and Iowa.

26. *Heterothrips arisaemae*, Hood. THE INDIAN-TURNIP THRIPS.
    Quincy, March 1909, on honeysuckle and *Rhodendron ulmiflorum*, H. F. Wilson, collector. (Morgan, '13.)
    Extends north to Virginia and Illinois.

27. *Heterothrips aesculi* Watson ('15). THE BUCKEYE THRIPS.
    Gainesville, Mar. 1914, April 1915, in blossoms of *Aesculus pavia*. Very common in blossoms of this plant.

KEY TO NORTH AMERICAN SPECIES OF HETEROTHRIPS

I. Prothorax twice as long as the head; antennae with apparently nine segments.
   a. Antennae without circles of distal sensoria on segment 4.
      b. Segment 3 light yellow, palest at the base; segment 4 brownish, palest toward the base; articulations of segments brown, not clear; wings brown, paler at base. Anterior femora shading to yellow at apex; fore tibiae yellow, shaded with brown laterally; tarsi yellow....*H. salicis* Shull.
      bb. Segment 3 yellow with white bands; segment 4 yellow to brown, lightest at the apex; some articulations brown, others clear; wings brown with a broad white band near the base. Anterior femora shading to brownish yellow at the apex; fore tibiae brownish yellow; tarsi brownish yellow. ....*H. aesculi* Watson.
   aa. Antennae with distal circles on segment 4; segments 1 and 2 slightly lighter than the body, shaded laterally with black; segment 3 light yellow, with a narrow sub-basal white band; distal third shaded with brown; segments 4-9 uniform light blackish brown except band of sensoria on segment 4. Wings blackish brown with a broad white band near the base. Legs concolorous with the body except tarsi and distal part of fore tibias which are yellow. ....*H. arisaemae* Hood.

II. Prothorax less than twice as long as head.
   a. Antennae with apparently ten segments; circles of sense areas on segments 4 and 5 (corresponding to segments 3 and 4 of other species of Heterothrips) light yellow; all others dark brown. Wings light brown, basal one-sixth clear. *H. decacornis* Crawford.
   aa. Antennae with nine segments.
      b. Posterior margins of abdominal tergites not fringed with scales.
         c. Abdomen not pubescent ....*H. borinquen* Hood.

cc. Abdomen closely pubescent; thorax finely striate.

d. Third antennae segment about 3.6 times as long as greatest width, grayish yellow. *H. analis* Hood.

dd. Third antennal segment less than 3 times as long as wide; pale yellow with orange pigment. .... *H. vitis* Hood. (Hood 1916.)

bb. Posterior margins of abdominal tergites 1-7 fringed with chitinous scales .... *H. pectinifer* Hood.

FAMILY MEROTHRIPIDAE

28. *Merothrips Morgan* Hood.

Pine Key, Jan. 1914. Found by Mr. R. C. Shannon in shell and debris. Taken by Mr. John B. Henderson.
Extends north to Maryland and Illinois.

FAMILY PHLOEOTHRIPIDAE

29. *Anthothrips niger* Osborn. (Redescribed by Hinds '02, p. 188.)
Quincy, 1905, on oats, wheat and tomatoes (Hooker, '07); March-May on *Plantago virginica*, rye, corn, rutabaga, oats, tomatoes, cocoa-grass. A. C. Morgan and H. F. Wilson. (Morgan, '13.)

30. *Anthothrips dozieri* n. sp.

♀.—*Measurements.* Length 1.5 mm. Head, length 0.187 mm., width 0.187 mm.; prothorax, length 0.16 mm., width 0.267 mm.; mesothorax, width 0.31 mm.; abdomen, width ———; tube, length 0.126 mm., width at base 0.069 mm., at the end 0.035 mm.; antennae, segment 1, 24; 2, 46; 3, 53; 4, 53; 5, 51; 6, 37; 7, 29; 8, 27 microns; total length 0.312 mm.

Color uniformly dark reddish brown except segments 3-6 of antennae. Legs 3-5 yellow, base of 6 yellowish-brown, apex light brown. Eyes reddish brown.

Head square; cheeks slightly arched and somewhat converging posteriorly. Ocelli large, posterior pair situated well forward, opposite the anterior third of the eyes whose margins they nearly touch, concolorous with the eyes. Mouth cone rather long and acute, reaching nearly to the posterior border of the prothorax. Post-ocular spine short and slender, tipped with a small and almost colorless but distinct knob as are all the spines on the anterior part of the body.

Antennae 8-segmented; segments rounded, the fourth somewhat thicker than the others. Sense cones and spines short, light-colored, and inconspicuous.

Prothorax wider than long, sides arched and converging markedly anteriorly; knobbed spines on both the anterior and posterior angles short.

Mesothorax somewhat wider, sides nearly parallel. One large, knobbed spine along the margin opposite the base of the wing. Other spines small and not knobbed.

Legs short and slender, weak, fore femora not thickened.

Wings well developed. Membrane reaching three-fourths the length of the abdomen; decidedly constricted in the middle. Hairs of the fringe long and nearly equal in length; seven of a second row present.

Abdomen swollen posteriorally. Rather long spines on the posterior portion, not knobbed. Tube tapering markedly, its length exceeded by six of the longer terminal spines.

Described from a single female.

Collected from Hop Hornbeam *(Ostrya virginiana)* by beating, Mar. 1917, by H. L. Dozier.

Type in the author's collection.

In the author's key (Entomological News, XXVII, p. 129) this species goes to *A. Flavipes* Jones, but it differs markedly in its size, relative length of antennal segments, and the color of the antennae and tarsi.

KEY TO NORTH AMERICAN SPECIES OF ANTHOTHRIPS

I. Postocular spines wanting; antennae almost uniformly brown except segment 3 and base of 4, which are light brown.—*A. niger* Osborn.

II. Postocular spines well developed.

- a. Postocular spines and most of those on the posterio-lateral margin of abdominal segments knobbed.
  - b. Total length 2.2 mm.; only the base of antennal segment 3 yellow; wings with 10-12 hairs of a second row. *A flavipes* Jones.
  - bb. Total body length 1.5 mm.; antennal segments 3-5 yellow; 7 hairs of a second row present. *A. dozieri* n. sp.
- aa. Posterior and abdominal spines not knobbed.
  - b. Apex of femora with a small anteriorally directed triangular tooth within; antennae uniformly brownish-black. —*A. nigricornis* Jones.
  - bb. Apex of femora without such tooth.
    - c. Segments 3-6 of antennae bright yellow, abdominal spines (except those of the tube) slender and rather faint. —*A. verbasci* Osborn
    - cc. Segments 3-6 of antennae light brown, abdominal spines stout and conspicuous.—*A. Variabilis* Crawford.
    - ccc. Only segment 3 of antennae wholly bright yellow; abdominal spines short and inconspicuous. —*A. floridensis* Watson

31. *Anthothrips verbasci* Osborn. (Redescribed by Hinds '02.) (THE MULLEIN THRIPS.)
    Quincy, on corn, May. (Morgan, '13.)

32. *Anthothrips floridensis* Watson. ('16.) ..(THE FLORIDA ANTHOTHRIPS.)
    Gainesville, April 22, 1914, on maize.

33. *Trichothrips amplipennis* Morgan. ('13, p. 33.)
    Quincy, May 15, 1910. On *Hypericum solabriforme.* (G. A. Runner and A. C. Morgan). (Morgan, '13.)

34. *Trichothrips terminalis,* Hood & Williams ('15).
    Orlando, collected from stump of a tree, Nov. 15, 1914, by C. B. Williams.

35. *Trichothrips fuscus* Morgan ('13, p. 36).
Quincy, May 21, 1910, swept from Spice-bush (Morgan, '13).

36. *Symphyothrips punctatus* Hood & Williams ('13).
Orlando, Jan. 21, 1913. Collected in body of orange tree by W. W. Yothers.

37. *Acanthothrips magnafemoralis* Hinds ('02, p. 199). (BIG-LEGGED THRIPS.)
Miami, Hinds '02. Type locally. "Food plant unknown." "Under bark of various trees and in dried leaves." North to Massachusetts and Illinois. (Hood, '17).

38. *Cephalothrips yucca* Hinds ('02, p. 194). (THE YUCCA THRIPS.)
Quincy, May 1910, on Yucca (Morgan, '13).
Extends north to Massachusetts and South to Barbadoes. (Hood, '17.)

39. *Cryptothrips floridensis* Watson ('13). (THE CAMPHOR THRIPS.)
Satsuma the original locality, Nov. 1912. W. O. Richtman collector. On camphor at all seasons, Glen St. Mary, Tampa, St. Petersburg, Lakeland, Macclenny. This would seem to be an introduced species, as it is not found in many localities in Florida. It has recently been found in Alabama and New Orleans, always on camphor. The writer has received specimens from Ceylon.

40. *Cryptothrips pini* Watson ('15). (THE PINE THRIPS.)
Gainesville, March, May, 1914. Common on pine trees among the needles.

41. *Cryptothrips citri,* n. sp.

FEMALE. *Measurements.* Total length 1.4 mm. Head, length, 0.16 mm., width 0.14 mm.; prothorax, length, 0.17 mm., width (including coxae), 0.28 mm.; abdomen, greatest width 0.27 mm.; tube, length 0.12 mm., width at base 0.053 mm., at apex 0.033 mm.; antenna, segment 1, 22; 2, 42; 3, 50; 4, 53; 5, 44; 6, 41; 7, 41; 8, 28 microns. Total 0.32 mm.

Color brown,, tibiae, tarsi, and third antennal segments yellowish-brown.

Head rounded in front; widest immediately behind the eyes and converging slightly behind; sides slightly convex; surface smooth; postocular spines moderately stout, about 50 microns long, knobbed. *Eyes* medium sized, orange by reflected light, black by transmitted light in balsam mounts; facets large. *Ocelli* yellow; the anterior facing obliquely upward; the posterior pair widely separated, contiguous with the margins of the eyes about .4 of the distance from the anterior ends. *Mouth cone* very broad at base, a little broader than the posterior end of the head, about .6 as long as broad, very rounding at the apex, not reaching the middle of the prothorax.

Antennae 8-segmented, nearly 1.5 times as long as the head. Segment 1 and base of 2 concolorous with the head, apex of 2 and segments 4 to 8 light brown, 3 yellow. Spines and sense cones short and light in color, inconspicuous.

Prothorax triangular in outline, the posterior angles very rounding, each bearing a moderately long, knobbed, light-colored spine. On each side there is a somewhat longer spine and on each anterior angle a shorter one.

Metathorax a little norrower than the prothorax; sides converging posteriorly; destitute of conspicuous spines. *Legs* of medium length. Fore femora considerably enlarged. Legs provided with a few short hairs. *Wings* reaching tip of abdomen. Fore pair constricted in the middle. fringed with long hairs; near the apex are three or four hairs of a second row.

Abdomen, first three segments destitute of conspicuous spines but posterior segments bear progressively longer ones and the last segment a pair of very long but pale ones. Tube rather small.

Described from three specimens collected at Fruitland Park, Fla., in Nov. 1916, under the loose bark of a citrus tree. This tree was affected with gummosis, a bark disease, and the bark was hanging in loose flakes. The insects were found under these flakes. Type in the author's collection.

Males unknown.

KEY TO NORTH AMERICAN SPECIES OF CRYPTOTHRIPS

I. Antenna 8-segmented.

- a. With prominent post-ocular spines.
  - b. Color uniformly black except the tarsi which are blackish brown; body length about 2.22 mm. ....*C. carbonarius*.
  - bb. Body color dark yellowish brown. Post-ocular spines knobbed.
    - c. About 1.7 mm. long. Head twice as long as wide. A dark spot behind each ocellus. Antennal segment 3 much shorter than 4 ....*C. salicis* Jones.
    - cc. About 1.4 mm. long. Head little longer than wide. Without dark spots behind each ocellus. Antennal segment 3 nearly as long as 4 ....*C. citri* n. sp.
- aa. No post-ocular spines. Color dark brown to coal black.
  - b. Antenna black but segment 3 with two brownish yellow bands. Body length about 2.7 mm. *C. rectangularis* Hood.
  - bb. Antennal segments 3 to 6 clear yellow, 8 and tip of 7 yellowish-brown. Body length about 1.9 mm. *C. floridensis* Watson
  - bbb. Antennal segment 3 brownish yellow; others brown, darker at tip. Body 1.7 mm. Antenna 7-segmented. *C. junctus* Hood.

42. *Barythrips sculpticauda* Hood & Williams ('15).
    Orlando Nov. 5, 1914. Collected from a pine stump by C. B. Williams.

43. *Letpthothrips mali* Fitch. (THE BLACK GARDEN THRIPS.)
    (Cryptothrips aspersus, Hinds '02. *Phyllothrips aspersus* Hood '08., *Leptothrips aspersus*, Hood '09).
    Quincy, on magnolia, beans, coffee-bean, cotton, *Cersis*, etc. (Morgan, '13.)

Orlando, "All times of the year on citrus foliage." (Back, '12.)
Key West, "Miscellaneous collecting." Runner & Morgan. (Morgan, '13.)
Gainesville, on leaves of citrus at all seasons, radishes, Nov. 19, 1914; mustard and turnips, Jan. 1915; abundant on avocados 1915. On grasses. Our most common black Thrips.
Extends north to Massachusetts; west to California and South to Panama and Barbadoes. (Hood, '17.)

44. *Haplothrips* (?) *bellus*, Hood & Williams ('15).
Orlando, Nov. 8, 1914, on rushes.
Leesburg, Nov. 16, 1914, "From grasses at edge of canal".
Emeralda, Nov. 17, 1914, on rushes. All collected by C. B. Williams.

45. *Haplothrips statices* Holiday.
"Florida" (Hood, '17).
Extends north to New York and Michigan and west to California and Oregon.

46. *Zygothrips bicolor* Hood & Williams ('15).
Orlando, Nov. 5 to 8, 1914, from Spanish moss on pine tree, on bamboo, on rushes. E. B. Williams, collector.
Emeralda, Nov. 17, on rushes. E. B. Williams, collector.

47. *Phloeothrips raptor* Crawford ('10).
Quincy, "Miscellaneous collecting." (Morgan, '13.)

48. *Phloeothrips floridensis* Watson ('13).
Gainesville, under bark of citrus in greenhouse. Jan. 1913.

KEY TO NORTH AMERICAN SPECIES OF PHLOEOTHRIPS

I. Postocular spines long and conspicuous.
- a. Segment 3 of antennae longer than 1 and 2 together; body color dark reddish brown; antennae light brown.
  - b. Head nearly 1.3 times as long as wide; antennae 1.3 as long as head; segment 3 more than 1.5 times as long as 1 and 2 together .... *P. jennei* Jones.
  - bb. Head slightly more than 1.3 times as long as wide; antennae 1.5 times as long as head; segment 3 about 1.1 times as long as segment 1 and 2 together; males with teeth at apex of fore femora. .... *P. armiger* Jones
- aa. Segment 3 of antennae shorter than 1 and 2 together; antennae mostly brown or with only the bases of segments 3 to 7 yellow.
  - b. General color yellowish brown, with considerable irregular red hypodermal pigmentation; antennae twice as long as the head or nearly so. Cheeks slightly arched.
    - c. Legs grayish brown; body length 1.68 mm.; postocular bristles knobbed; mouth cone reaching across prothorax .... *P. pergandei* Hinds.
    - cc. Femora brownish yellow; tibiae and tarsi yellow; body length 2.5 mm.; poctocular bristles not knobbed; mouth cone reaching two-thirds the distance across phothorax .... *P. floridensis* Watson

bb. General color brown; fore tibiae and all tarsi light brown; cheeks strongly arched; antennae 1.5 times as long as the head. .... *P. raptor* Crawford.

bbb. General color dark brown, tibiae and tarsi bright yellow; cheeks nearly straight; antennae 1.75 times as long as head. .... *P. uzeli* Hinds.

II. Postocular spine wanting; general color dark mahogany brown, with many small white pigmental markings along head, thorax, abdomen and legs. .... *P. maculatus* Hood

49. *Liothrips flavoantennis* Watson ('16). (YELLOW-HORNED THRIPS.)
Gainesville, Fla., April 23, 1914. On wild grape.

50. *Liothrips caryae var. floridensis* Watson ('16). (THE HICKORY-GALL THRIPS.)
Gainesville, Fla., May and June 1914-16. In galls of *Phylloxera* on hickory.

51. *Gynaikothrips uzeli* Zimmerman. (THE CUBAN LAUREL THRIPS.)
(*Mesothrips ficorum*, Marchal, *Liothrips bakeri* Crawford.)
Key West on *Ficus* (Russell, Bur. Ent. Bull. 99).
Miami, Fla., Wilmon Newell. A severe pest.

52. *Anophothrips megaceps* Hood and Williams ('15.).
Emeralda, Fla., Nov. 17, 1914, E. B. Williams, collector.

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A PARTIAL LIST OF THE DIURNAL LEPIDOPTERA INDIGENOUS TO FORT MYERS, EXCLUSIVE OF THE HESPERIDAE

By SHIRLEY B. WALKER

Papilio ajax, Linn., Var. *floridensis,* Holland.
Papilio ajax, Linn., Var. marcellus, Boisd.
Papilio asterias, Fab.
Papilio cresphontes, Cramer.
Papilio palamedes, Drury.
Papilio philenor, Linn.
Papilio troilus, Linn.
Papilio turnus, Linn.
Pipilio turnus, Linn., Dimorphic ♀, *glaucus,* Linn.
Catopsilis agarithe, Boisd.
Catopsilis eubule, Linn.
Catopsilis eubule, Linn., Albino Form.
Terias lisa, Boisd.-Lec.
Terias nicippe, Cramer.
Anosia berenice, Cramer.
Anosia plexippus, Linn.
Basilarchia floridensis, Strecker.
Lycaena ammon, Lucas.
Lycaena hanno, Stoll.
Lycaena marina, Reakirt.
Lycaena theonus, Lucas.
Thecla melinus, Hubner.
Anartia jatrophae, Linn.
Grapta interrogationis, Dimorphic Form—*umbrosa,* Lintner.
Chlorippe alicia, Edwards.
Neonympha phocion, Fab.
Neonympha sosybius, Fab.
Pyrameis huntera, Fab.
Pyrameis atalanta, Linn.
Junonia coenia, Hubner.
Junonia genoveva, Cramer.
Dione vanillae, Linn.
Euptoieta claudia, Cramer.
Heliconius charitonius, Linn.
Pieris monuste, Linn.
Eunica sp. (probably tatila).
Nathalis iole, Boisd.

A member suggests that, instead of bombarding the Germans with bombs, copies of Wilson's declaration of war, etc., we load up a few aeroplanes with Colorado potato beetles and spread them over the empire. Would the Hague Convention allow this?

STRATEGUS WANTED—Am making a special study of this genus, of the Scarabeidae, and should be very glad to receive Florida specimens, especially of the rarer species. Will exchange or pay reasonable cash prices. Address W. Knaus, McPherson, Kansas.

E.O. Painter Fertilizer Company

The
Florida Buggist
Official Organ of the Florida Entomological Society

VOL. II FALL NUMBER NO. 2
September, 1918
(Printed in November)

ENTOMOLOGY AS A PURE SCIENCE*

By E. W. BERGER

My chief concern about this society and its publication (THE FLORIDA BUGGIST) is that it should always reflect Entomology as a true science, as distinguished from Applied Entomology or Economic Entomology. From the nature of our organization, we shall not need to worry about the applied side not being duly represented, for we are practically all economic entomologists, or near-entomologists, or otherwise interested in insects that injure crops. But, if for no other reason than for the sake of those in our organization whose training in entomology has been limited, I believe that we should make every effort to present some papers and articles having a bearing upon the science of entomology in its broader aspects. For instance, Prof. Watson's paper on The Thysanoptera of Florida (THE FLORIDA BUGGIST, Vol. I, No. 4 and Vol. II, No. 1) is such a paper, it being a distinct and permanent contribution to the science.

There was a time, perhaps not a hundred years ago, when science was studied for the sake of knowing, for the information that it yielded about the natural things surrounding us, and the pleasure it afforded to the few. More recently, however, it has become the business of mankind to apply scientific knowledge of all kinds in every-day affairs so that men and institutions have arisen whose primary object it is to make science practical. This condition of affairs has caught the attention of the public and the business man, so that pure science has stood in danger of being neglected. But it is apparent to the thoughtful that in order to

*Paper read before the Florida Entomological Society, Dec. 17, 1917.

keep up the supply of new ideas, principles and knowledge for the workers in applied science, the investigations in pure science must be continued. In other words, if new ideas, new principles, new facts were not being brought out continually, the worker in applied science, including economic entomology, would soon be at a standstill.

As an illustration of the importance of isolated and apparently insignificant facts and principles, the development of another science appeals to me, and I believe that this also lends itself better as an illustration.

As an example of the slow accretion of knowledge, sometimes accidental, sometimes fostered studiously by individuals, later by groups of men and students at universities and other seats of learning, and finally by institutions established for the purpose, until the few scattered facts, at first apparently useless and largely curiosities, became developed into a system of related facts and principles, I love to think of the science of electricity and magnetism. From static electricity, generated by rubbing a piece of amber (a fact known to the ancient Greeks 600 B. C.), to the modern telephone, the dynamo and motor, the X-ray, and finally, the wireless, is a far cry. However, any one who knows something of the facts, I am sure, will subscribe to the statement that the modern electric locomotive, for instance, was presaged by the apparently trivial and curious electrical phenomena known to the Greeks, the inventions of the Italians, Galvani and Volta, and later in the coils of wire and magnets of Faraday. I love to think of it, that the germ of the electric motor and dynamo was present in the very simple experiment of the deflection of a magnetic needle by means of an electric current passed thru a wire near it. This simple experiment first demonstrated the relationship between magnetism and electricity, and while apparently useless knowledge then, was a ready-made fact for Faraday and others, so that today we have all kinds of electrical apparatus and machinery serving mankind.

Coming back to our own subject of entomology, the classifications of insects and the studies on structure, particularly of the mouth-parts and their uses, and the manner in which insects breathe, were the foundation on which those who were devising methods for destroying insects could build. While no doubt successful attempts at destroying injurious insects were made by those having no particular knowledge of insects, the process could only be carried on with understanding by those knowing something of the structure and life history of the insects that they desired to destroy. As an illustration of the futility of blind effort in an attempt to control an insect, I have in mind the spraying operations against the citrus whiteflies in Florida. Power sprayers were bought and an attempt made to spray the groves in a whole county (Orange County, 1906) regardless of the time at which the fly was most susceptible to sprays, with the result that spraying was once more condemned as a failure. The facts were known to the entomologists that had been in the State prior to that time, but whether these facts had not been sufficiently featured in the bulletins or were ignored by the parties undertaking the spraying, I cannot advise. At all events, the whitefly of citrus is now successfully controlled by spraying.

To sum up this part of my paper, it is apparent that no facts, ideas, principles or laws, tho apparently insignificant and useless at the time of discovery, are useless, but will eventually be applied in the life of mankind. The world can never know whether a fact is economically useful and important until it finds out, and for that the world may need to wait a thousand years.

From motives of a pure desire to know, any one could study insects (I mean the insects themselves, not books) from the following points of view; in fact each point of view is a science by itself: Taxonomy; Morphology; Ecology; Psychology—behavior, instincts; Paleontology.

TAXONOMY OF INSECTS

This includes description and classification of insects into orders, sub-orders, families, genera, species, and sometimes varieties. (I should perhaps explain that the term Taxonomy means classification, and is used in the same sense whether applied to the classification of insects, other animals or plants.) This phase of entomology has probably been more extensively studied than the others, and was for a considerable period of the last century the principal subject of insect study. Classification may also have been the very first phase of entomology to engage students of nature. It would only be natural to arrange a collection of insects into groups according to their likenesses and give the groups names. Aristotle was apparently the first to leave a record of this kind. He made a classification of animals, and his classification of insects is only a part of the whole.

MORPHOLOGY

Morphology is the study of form and structure of animals, and logically it should precede classification, as classification is based upon form and structure; but in point of time it largely followed classification, which was then based mostly upon the external characteristics only. Studies of form and structure naturally bring out relationships, and, thanks largely to morphology, we now have classifications of insects, and other animals, that represent more nearly true relationships.

It will be quite apparent that the form and structure of an insect, or other animal, or plant, may be studied from three points of view: Anatomy, Histology, Embryology.

Anatomy.—This consists in the study of the organs, or larger units of an animal. We may speak of the external anatomy and the internal anatomy. External atanomy deals with the shape, structure and relative positions of the external organs: wings, mouth parts, head, legs, eyes, etc., of an insect; internal anatomy with the internal organs.

Histology.—Histology is the structure of living things as manifested by the microscope. From this we learn, for instance, that the organs and parts of insects are made up of microscopic cells, or units, similar to those of other animals and plants.

Embryology and Life History.—A tracing of the development of an animal, be it insect, bird or mammal, prior to its birth or hatching from an egg is called embryology. It may be stated here that some insects are born alive. The complete life history of an animal consists of its several developmental stages, including its embryology. Specifically, in most insects, it includes the following stages or states of development: egg, embryo, larva (grub, caterpillar, maggot, etc.), pupa, and adult. For the study of embryology a compound microscope and other special apparatus is necessary, as well as a knowledge of special methods to preserve the many delicate and microscopic structures found.

ECOLOGY

When a naturalist, whether entomologist or other investigator, studies insects or other organisms inhabiting certain localities in an endeavor to solve their mutual relations to each other and to their environment, we have the science of ecology, meaning, literally, a study of the household.

PSYCHOLOGY: BEHAVIOR, INSTINCTS

This title is quite self explanatory as to its subject matter. The habits and instincts of insects are varied and have been extensively studied. This is especially true for ants, bees and wasps.

The definition of psychology is science of mind, and it may be questioned whether insects have mind, as this term is ordinarily used. The writer, nevertheless, prefers to retain the term, psychology, as it is difficult to believe that there should not be some form of mind involved in all the manifold activities of insects.

PALEONTOLOGY

The study of the remains (fossils) of living things found in the different layers of rock and earth forming the earth's crust is called paleontology. The fossil insects found indicate profound changes in the insect life of this earth during its successive geological periods. Of unusual interest are the insects found embedded in the fossilized accumulations of resin known as amber. Paleontology shows that insects as a whole are, geologically speaking, a recent group. Their soft, or at best chitinized bodies do not readily form fossils and so it happens that, as compared with animals having bony and calcareous parts, their past is poorly preserved.

ECONOMIC ENTOMOLOGY
MEDICAL ENTOMOLOGY

These two sciences were not included in the preceding list because they deal directly with the practical application of entomological knowledge to human affairs. They draw largely for their information upon the phases of entomological science previously noted, altho each has its own problems to solve and investigations to make, and each is just as scientific as the other. The former, however, are regarded as in the realm of pure science, in which the practical application of the results is not necessarily considered, whereas the latter (the subjects of this topic) are in the realm of applied science, where the practical application of results obtained is the primary object.

REPORTS OF MEETINGS

June 24. Visitors present were Professor Carl J. Drake, Associate Professor of Entomology, The N. Y. State College of Forestry, Syracuse University, Syracuse, N. Y., and Mr. Geo. F. Arnold, Nursery Inspector, State Plant Board of Mississippi.

Under "Timely Notes" Prof. Watson reported that stink bugs and pumpkin bugs were attacking fruit unusually early this year.——In answer to a question by Dr. J. H. Montgomery, Prof. Watson advised that the Whitefly Ladybeetle *(Delphastus catalinae)* received by him from the State Insectary of California, and introduced into several places in Florida, was reported as having become established at Bradentown, but that he had not been able to go and verify the report.

In the first paper of the evening, "Insects and the Optimistic Grower", Mr. F. M. O'Byrne, Inspector of Nursery Stock, noted some personal experiences and made some suggestions valuable to those whose lot it becomes to recommend treatment for insects or diseases. Some growers will follow the advice of the last visitor rather than of the man supposed to know. Others, the optimistic kind, discount all recommendations made. In such instances, reference to concrete results obtained by others who had the same insects or diseases in their trees are most convincing. In general, advice given should anticipate mistakes growers may make and be followed by a second visit if possible. Recommendations should preferably be in written form in which necessary details should be stressed.

The second paper of the evening, "Storage and Fumigation of Corn and Other Seeds for Weevils", was by Mr. R. L. Clute. Mr. Clute first briefly referred to the kinds of insects generally found infesting stored plant products in Florida, and then showed plans for the proper storage of corn, etc., in which fumigation for insects can be properly done. The importance of storing corn without the husks was particularly emphasized, as it requires less room for storage and less carbon bisulphide for fumigation. Several photographs of good storage houses in use in Florida were also exhibited. Mr. Clute is embodying the subject matter of this paper in a practical bulletin for farmers and others.

In a third paper of the evening, "The Purse Spider and Two Rare Tingids", Professor Drake gave some very interesting information. The Purse Spider, supposed to be of rare occurrence, was found by Prof. Drake to be quite common at Gainesville, Fla. He had previously taken a specimen from a frog's stomach at Cedar Point, Ohio. A colony of these spiders has been reported at Washington, D. C., and Professor J. H. Comstock collected it at Lake City, Fla., some years ago.——The first tingid in question is *Teleonemia belfragei,* now very common on *Callicarpa americana* (French mulberry) on the University campus and vicinity at Gainesville. Previously reported only from the West Indies, *Callicarpa* is furthermore a new host for this tingid. ——The other tingid is *Dichocysta pictipes,* of which Prof. Drake collected two specimens in the hammock on the University campus. This species had previously not been collected east of Arizona in the United States, but is found in Mexico.

July 22. Visitors present were Miss Isabelle Mays, Instructor in Mathematics, University Summer School, and Mr. E. L. Robinson, Asst. Principal, Public Schools, Tampa.

Professor Carl J. Drake, School of Forestry, Syracuse University, N. Y. State, and Mr. E. L. Robinson were elected to the membership of the Society.

Under "Timely Notes" Professor Drake reported a new species of Fulgorid (Lantern-fly Family) on gallberry and huckleberry about Gainesville, Fla.——Professor Watson reported on the successful use of Kansas bait on the Fall Army Worm *(Laphygma frugiperda)* on a property south of the University grounds, and that army worms were general over the State from Miami to Bonifay and Chipley.——Mr. Geo. B. Merrill reported briefly an outbreak of the Fall Army Worm just north of Gainesville, advising that the same was controlled in part by dusting zinc arsenite and calcium arsenate and in part by plowing furrows to keep the worms back.

In the first paper of the evening, Plant Commissioner Wilmon Newell described an outbreak of the Banana Root Borer *(Cosmopolites sordidus)* in South Dade County. Thirty-four properties were inspected from January 6 to 19, of which seven were found infested. This beetle had been declared a public nuisance by the Plant Board only in the December (1917) preceding. Eradication work was at once begun by digging and burning the plants. Split banana stems were used as baits in the fields and large numbers of the beetles caught and destroyed. This beetle is a pest in Cuba, Jamaica, British Guiana, islands of the South

(Continued on page 91)

The
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PROF. J. R. WATSON..Editor
DR. E. W. BERGER......Associate Editor, Acting Business Manager

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Fumigation of citrus trees may be revived in Florida. The Roessler and Hasslacher Chemical Company is conducting extensive demonstrations at Windermere and elsewhere in Florida. Improved methods of generating and discharging the gas under the tents by means of a machine greatly simplify and shorten the operations. Particulars may be obtained by addressing Mr. J. B. Dales, Pine Tree Inn, Windermere, Fla.

THE CALIFORNIA DELPHASTUS

The whitefly-eating lady-beetle *(Delphastus catalinae)* continues to multiply in several Florida groves at a most gratifying rate. In the grove near Bradentown they are present in countless thousands and arrangements have been perfected for shipping these beetles from there to different parts of the state. It is desired to introduce them into all citrus communities. It is thought that enough are now in sight to supply a colony to any grower who desires one. Anyone interested should apply to his county agent or to the Department of Entomology of the Experiment Station. A small charge, sufficient only to defray the cost of collecting and packing, is made for these.—J. R. W.

AN OUTBREAK OF THE COTTON STAINER ON CITRUS

Citrus and avocado growers in some of the southern counties of the state where, in order to escape the boll weevil, cotton has been raised this season, are having trouble with the Cotton Stainer *(Dysdercus saturellus* (H. S.)). This bug is a pyrrhocorid with deep red body and black wings and is sometimes called the "red bug." This is a common name for the cotton stainer in the West Indies and would be appropriate and desirable for Florida were it not preoccupied by those pestiferous mites, the larvae of Trobidium, with which we are all too well acquainted.

On citrus the cotton stainer does about the same type of damage as the pumpkin bug *(Nezara viridula)*, i. e., it punctures the rind and the fruit soon drops from the tree and decays. The punctures, however, are smaller and entirely invisible to the naked eye. There is not the hardening and discoloration of the surrounding tissue characteristic of pumpkin bug injury. The bugs feed mostly on the oil cells but frequently penetrate to the pulp. They are much more restless than the pumpkin bugs and do not remain feeding in one spot for hours as the latter frequently do. They show the same preference for thin-skinned varieties of citrus, tangerines being their first choice. They are not as apt to feed all night as are the pumpkin bugs, but usually collect in colonies on the interior of the tree. Even in the day time they are distinctly gregarious, collecting in colonies on the leaves and fruit both on the tree and the ground.

The present outbreak has undoubtedly been brought on by the planting of cotton in citrus communities. No outbreak has been recorded in communities where no cotton was planted. The adults can fly considerable distances. The writer recently saw one heavily infested grove that was three-fourths of a mile from the nearest cotton. There were adults only in this grove. Another grove directly across a road from a cotton patch was heavily infested with both adults and young. Scattering half grown nymphs were seen as far as 800 feet from the cotton. The vast majority of these had crawled from the cotton field. Indeed, scores were observed in the act of crawling across. They travelled in a nearly straight line for the citrus as if they smelled it, altho the wind was from another direction. However, one colony of very young nymphs was observed that must have hatched from eggs laid on fallen oranges. The nymphs were but a few days old and were bunched in a compact colony after the fashion of newly hatched nymphs of these bugs. It is incredible that the colony could have crawled *en mass* such a distance without becoming scattered. A search was made for Spanish cockle-burr on which they might have bred but none was found. Evidently, they can occasionally breed on citrus, altho Hubbard states that they do not do so.

Evidently the growing of cotton in citrus communities in the southern counties should be abandoned. Altho the bugs are rather sporadic in their appearance, being abundant some years and scarce others, the practice involves too great a risk. Hubbard, in "Orange Insects", warns against the practice. Another statement that he makes, however, is erroneous, or at least only partly true. He states that chickens will not eat the bugs. The writer saw chickens gorging themselves on the bugs, both nymphs and adults. The chickens had saved a portion of a cotton field nearest a house from destruction. It is easy to make a mistake like this in regard to the food of chickens. Fowls are often rank "standpatters", refusing absolutely to even taste a food to which they are unaccustomed. Probably it would frequently happen that a handful of cotton stainers thrown to fowls that had never eaten this species of bug would at first be refused. The writer has had a similar experience with pumpkin bugs which are usually eaten by hens. Indeed he once owned a flock of hens which persistently refused to touch perfectly good Kaffir corn.

The cotton stainer is a southern species and usually does severe damage only in the southern part of the state. Indeed Barber, in his list of the "Hemiptera of Florida", does not record it from north of Lake City and St. Augustine. The absence of any reports from the northern counties, however, is probably due to the absence of entomologists rather than the absence of the bugs, as it is recorded as a pest of cotton in South Carolina, Georgia, and Alabama. It has been recorded from many places in Florida not in Barber's list (see Sellards in Rep. of Fla. Ag. Exp. Station, 1905). Apparently in the compilation of this list, as in some others of the series of lists published by the American Museum of Natural History, the literature of economic entomology has been largely ignored.

Two other species are listed by Barber as having been taken in the extreme southern part of the state. One of them, and at least two other species of the genus, are severe pests of cotton in the West Indies. One of these, *D. delanneyi* Seth., has "been rendered negligible" in St. Vincent by the destruction of its wild hosts, the silk cotton tree, the wild okra *(Malachra capitata)*, and the John Bull tree. Perhaps the same happy result could be achieved in Florida by the destruction of the Spanish cockle-burr *(Urena lobata)* on which it largely breeds in the absence of cotton.

The name "cotton stainer" is derived from the effect of these bugs on cotton lint. They feed on the seed and collect on the bolls in the fields, staining the lint a pinkish or reddish color, greatly lowering its value. This staining is said (West Indian Bulletin XVI No. 3, p. 236) to be due not directly to the bugs but to fungi and bacteria which follow.—J. R. W.

REPORTS OF MEETINGS

(Continued from page 87)

Pacific and India. The infestation was traced to a nursery on the West Coast.

"Pumpkin Bugs", the second paper of the evening, was read by Professor Drake, who was then investigating the habits and life history, but especially the insect enemies of these bugs. Professor Drake suggests the common name of Southern Green Stink Bug for *Nezara viridula* to distinguish it from *Nezara hilaris* which is the commoner species farther north but also found here. *N. viridula* is in northern Africa, Asia, and other parts of the world. *N. marginata* and *N. pennsylvanica* are also in Florida but rare. Radish is the favorite food of these bugs in spring and is suggested as a trap crop to protect other plants and vegetables. Cowpeas are also much attacked.——The egg masses of *N. viridula* average 80-90 eggs and hatch in 4-5 days. There are 5 instars, or stages, i. e., there are 5 sizes of the bugs, counting the newly hatched and including the full grown bugs. The life cycle is 4-6 weeks in summer. *N. viridula* has its share of natural enemies, including the Wheelbug, Tachina Flies, Sarcophagidae, and egg parasites. The Tachina Flies and Sarcophagidae are flies resembling houseflies, but are more hairy, and it is the maggots of these flies that infest the bugs.

Both of these papers were discussed by those present.

August. No meeting was held because so many of the resident members were absent from Gainesville on account of professional duties.

September 30. Twenty-seven visitors were present from among those who were attending the Citrus Seminar and the Live Stock Roundup at the University.

The first paper of the evening was by Mr. W. L. McAtee of the U. S. Biological Survey. Mr. McAtee gave a very instructive account of the different lines of work conducted by the Survey. These include investigations of the useful and injurious mammals and birds of the United States, habits and distribution of North American animals, enforcement of federal laws pertaining to importations, quarantines, etc., and a game law section. The Society's interest, however, was centered mainly upon the methods of identifying insect remains in bird's stomachs. This is a very difficult task, but not impossible, since there are certain hard parts of insects, such as jaws, that admit of fairly accurate identification. Brief accounts of the insect diet of such birds as the bullbat, swallow, quail, oreole, flicker, etc., were given. Thus, the quail, swallow and oreole are undoubted enemies of the Boll Weevil. 5000 ants were found in the stomach of a single flicker. The Boll Weevil is eaten by 66 kinds of birds, the Gypsy Moth by 45 kinds, and leaf-hoppers by 200 kinds.

The second paper of the evening was a round table discussion of common names of insects, led by Professor J. R. Watson. While common names are of practically no value to the entomologist whose requirements are wholly met by the scientific names, it is recognized that common names are needed when discussing insects with growers and others who are generally not familiar with the use of scientific names. The trouble with common names, however, is that there may be several of them in use at the same time or in different localities for the same insect, and it is apparent that in written articles at least, some one name should be selected and used and not a different one in each article. Thus *Nezara viridula*, commonly known as the Pumpkin Bug, is also called the Southern Green Plant Bug, while the name Southern Stink Bug has been suggested. Again, *Selenaspidus articulatus* is known as the West Indian Red Scale, or Rufous Scale. It being apparent that, in order to secure uniformity in common names and to avoid the duplication of such, some one should be recognized as authority to indicate the preferred common names. To further this end, it was voted, on motion of Mr. Wm. Somme, that the President appoint a committee of three on common names of insects. Appointed were J. R. Watson, E. W. Berger and Dr. J. H. Montgomery. It will be the duty of this committee to report to the Society from time to time lists of the preferred common names of insects for publication in THE BUGGIST. Discussion was continued at the next meeting.

Approximately 300,000 species of insects have been described and named and there are probably five times as many more.

KATYDID

Thou art a female, Katydid!
I know it by the trill
That quivers through thy piercing notes
So petulant and shrill.
I think there is a knot of you
Beneath the hollow tree,
A knot of spinster Katydids—
Do Katydids drink tea?

(*O. W. Holmes—To an Insect.*)

It is stated that over 150,000 species of beetles have been described in the world.

FLORIDA ENTOMOLOGICAL SOCIETY

Organized to further the discovery and dissemination of knowledge about insects, especially Florida insects. The Society appeals to all those interested to join and assist. It is the only organization of its kind in Florida and the South. Your membership will strengthen the Society and THE FLORIDA BUGGIST, its official publication. Annual dues are $1.00, which includes THE BUGGIST. The headquarters of the Society is Gainesville, Fla. The regular monthly meetings are held on the 4th Monday of each month in Science Hall, University of Florida, from 4:30 to 6 p. m.

Officers: President, Dr. H. S. Davis; vice president, Mr. F. M. O'Byrne; secretary-treasurer, Dr. E. W. Berger; member executive committee, Dr. J. H. Montgomery.

E. O. Painter Fertilizer Company

The
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DECEMBER, 1918
(Printed in February, 1919)

NEW THYSANOPTERA FROM FLORIDA—IV.

J. R. WATSON

53. *Trichothrips brevitubus* n. sp.

Measurements: Head, length 0.187 mm., width 0.2 mm.; prothorax, length 0.115 mm., width 0.3 mm.; abdomen, width 0.4 mm.; tube, length 0.1 mm., width at base 0.064 mm., at the apex 0.032 mm.; total body length 1.17 mm. Antennae: segment 1, 24; 2, 52; 3, 64; 4, 63; 5, 52; 6, 48; 7, 46; 8, 26 microns; total length 0. 39 mm.

Color, including legs and tube, brown, head and abdomen very dark brown. Antennae entirely bright yellow except segment 8, which is light brown.

Head nearly square in general outline, a little wider than long, sides convex, an acute projection between the bases of the antennae. The only prominent spine is the post-ocular which is about 26 microns long. Like all the other spines on the body it is dark brown and ends in a small colorless knob. Eyes rather small, about nine facets showing in lateral profile which occupies about two thirds of the margin of the head, not protruding, black. Ocelli inconspicuous, posterior pair situated far forward opposite the anterior .2 of the eyes whose margins they touch, widely separated. The anterior one points forward, color very dark. Mouth cone long and tapering, reaching a trifle beyond the posterior margin of the prothorax. Antennae twice as long as the head, 8-segmented, spines and sense cones rather short, especially on the basal segments, all colorless and inconspicuous.

Prothorax broad and short, approaching a semi-circular outline, sides convex and sharply diverging posteriorly, a long (81 microns) heavy spine near each posterior angle, each angle provided with a single shorter spine.

Pterthorax with sides convex and slightly converging posteriorly, without prominent spines. Legs moderately long and slender, without prominent spines. Wings rather short, membrane not reaching the end of the abdomen, fringed with long hairs that reach little beyond the end of the tube.

Abdomen wide and short, about a third longer than broad, bearing a few dark spines which become long and heavy posteriorly. Tube but little more than half as long as the head. The longest of the terminal bristles about equal to the length of the tube.

Described from a single female brot to the author by the janitor of the experiment station building with the statement that he extracted it from his eye where it was very painful, causing a much more severe smarting than a gnat.

Gainesville, Fla., August, 1918.

Type in the author's collection.

The following key will enable one to separate the North American species (except *T. semicaeus* the description of which, in Uzel, is too brief) which are now (see Hood in Entomologist, Vol. XLVIII, No. 624, May, 1915, p. 106) placed in the genus Trichothrips. Moulton's key (U. S. D. A. Bur. Ent. Tech. Ser. 21) has been followed for the species there given.

KEY TO THE SPECIES OF TRICHOTHRIPS OF NORTH AMERICA

I. Prominent spines on body with blunt or dilated tips; most forms very dark brown or nearly black (except *T. angusticeps)*, usually with short wings (except *T. longitubus)*.

- a. Each fore tarsus armed with a tooth; antennae about 1.7 times as long as head; total body length about 1.5 mm. *T. angusticeps* Hood.
- aa. Fore tarsi not armed; antennae about twice as long as head.
  - b. Wings fully developed; body length about 1.8 mm.; tibiae, tarsi, and intermediate segments of the antennae bright lemon yellow; tube fully as long as the head. *T. longitubus* Hood.
  - bb. Wings short; body length about 1.2; whole antenna clear yellow; tube about half as long as the head. *T. brevitubus* n. sp.

II. Prominent spines on body acute; antennae about twice as long as head.

- a. Individuals small, about 1 mm. in length, without ocelli or wings.
  - b. Eyes reduced, lateral profile showing but three facets; first segment about half as long as the second....*T. smithii* Hood.
  - bb. Eyes small but normal; first antennal segment nearly as long as second. ....*T. flavicauda* Morgan.
- aa. Individuals rather large, 1.5 mm. or more, wings fully developed or brachypterous.
  - b. Each fore tarsus armed with a tooth.
    - c. Antennae 1.75 times as long as head; tube .7 as long as head; total length about 2 mm., fore tarsi with a short, stout tooth. ....*T. ambitus* Hinds.
    - cc. Antenna slightly more than twice as long as the head; tube slightly shorter than head.
      - d. Total body length about 1.7 mm.; fore tarsi with a small acute tooth; wings light gray brown, spotted with darker. ....*T. americanus* Hood.
      - dd. Tarsi with a large tooth.
        - e. Last two antennal segments completely united; eyes very small; body length about 1.5 mm. ....*T. anomocerus* Hood.

ee. Last two antennal segments not compactly united; eyes normal; body length 1.8 mm. or more.

f. Tarsal tooth straight. *T. marginalis* Hood & Williams.

ff. Tarsal tooth curved. *T. terminalis* Hood & Williams.

bb. Tarsi unarmed. ....*T. zonatus* Hood.

MEGALOMEROTHRIPS, gen. nov.

Head considerably longer than wide; cheeks with a few stout bristles but without warts; antennae about twice as long as the head, 8-segmented, intermediate segments elongated. Mouth cone about as long as width at the base which is swollen to a diameter considerably greater than the width of the head; labium rounded but labrum sharp-pointed, reaching nearly to the mesosternum; fore femora enlarged, without teeth; tarsi without teeth. Wings short and weak, not narrowed in the middle. Tube long and slender.

Type *M. eupatorii* n. sp.

54. *Megalomerothrips eupatorii*, n. *sp.*

Measurements: Total length 2.1 mm.; Head, length 0.31 mm.; width 0.23 mm.; Prothorax, length 0.24 mm, width (including coaxe) 0.43 mm.; mesothorax, breadth 0.40 mm.; abdomen, breadth 0.46 mm.; tube, length 0.34 mm., width in the middle 0.08 mm. Antennae: segment 1, 59; 2, 68; 3, 148; 4, 118; 5, 88; 6, 71; 7, 58; 8, 43 microns; total 0.62 mm.

Color an almost uniform light brown; posterior segments of abdomen darker and segments 2 and 3 of antennae very light yellow, 3 almost colorless as are the last tarsal joints.

Head subquadrangular in outline, about ⅓ longer than wide; frons but slightly convex; cheeks nearly parallel, but slightly convex, provided with a few short thick spines; post-ocular bristles rather long, exceeding the eyes; dorsal surface of head with faint cross-striations. Eyes rather small, not protruding, black. Ocelli prominent, all facing upward; posterior pair opposite the middle of the eyes but not touching their margins. Mouth cone about as wide as the width at the swollen base, labrum tapering to a point, exceeding the labium and nearly reaching the mesosternum. Antennae 8-segmented; segment 3 long and almost colorless; sense cones and bristles colorless and inconspicuous.

Prothorax shorter than the head; wide; sides sharply diverging posteriorly and very convex; posterior angles very rounding, provided with moderately long but colorless spines with blunt tips.

Pterothorax; sides nearly straight, converging posteriorly; a pair of stout short spines about the middle of the mesothorax. Legs moderately long, concolorous with the body except for the colorless last joints of the tarsi. Fore femora greatly enlarged, ¾ as wide as the head. Wings very short and weak, not nearly reching the base of the tube; fringed with rather short hairs, about 20 interlocated ones.

Abdomen elliptical in outline, no bristles on anterior segments but heavy ones on the posterior ones, the longest exceeding the tube. Tube longer than the head, narrow with almost parallel sides, tipped with a few spines which are only slightly more than half the length of the tube.

♂ unknown.

Described from a single female taken by beating *Eupatorium ageratoides* in bloom. Nov. Gainesville, Fla. Type in the author's collection.

The following key will enable one to separate the new genus from the others of section 2 of the Phloethripidae (Moulton Bul. 21 Tech. Sc. Bur. Ent., U. S. D. A.), comprising those genera in which the head is considerable longer than wide and longer than the prothorax. This is not a very good character on which to divide the family, as it divides at least one genus (Haplothrips), but it is a convenient one, and much used.

KEY TO THE GENERA OF PHLOEOTHRIPIDAE

II. Head considerably longer than wide and longer than the prothorax.

- a. Head less than twice as long as wide.
  - b. Fore femora with a tooth on the inner side near the end. In our species the fore femora are enlarged but the intermediate antennal segments are not elongated. *Acanthothrips*, Uzel. *(Hoplothrips).*
  - bb. Fore femora unarmed, in the female, at least.
    - c. Wings wanting, reduced to pads, or very short and weak.
      - d. Mouth cone shorter than its width at the base, labrum with a blunt tip. ....*Cephalothrips* Uzel.
      - dd. Mouth cone as long as width, labrum sharply pointed.
        - e. Cheeks with spine-bearing warts. *Malacothrips.*
        - ee. Cheeks without spine-bearing warts.
          - f. Intermediate antennal segments not elongated. Fore femora not greatly enlarged.
            - g. Cheeks parallel, fore tarsi armed with spines. *Neothrips* Hood.
            - gg. Cheeks arched, fore tarsi unarmed. *Gnophothrips* Hood & Williams.
          - ff. Intermediate antennal segments elongate, fore femora greatly enlarged. *Megalomerothrips*, gen. nov.
    - cc. Wings fully developed.
      - d. Wings constricted in the middle.
        - e. Mouth cone broadly rounded at the end.
          - f. Cephalic bristles normal.

g. Wings only slightly narrowed in the middle; head length more than 1.5 times the breadth; fore tarsi unarmed. *Cryptothrips* Uzel.

gg. Wings distinctly narrowed in the middle; head length less than 1.5 times the breadth; fore tarsi with a tooth. *Haplothrips* (in part).

ff. One pair of cephalic bristles (not including the post-ocular) much elongated.

g. Post-ocellar bristles elongated; anterior margin of prothorax semicircular, emarginate and greatly thickened. *Dichaetothrips* Hood '14.

gg. Pair of bristles laterad of median ocellus elongated; anterior margin of prothorax normal. ....*Diceratothrips.*

ee. Mouth cone acute at the tip; wings considerably narrowed in the middle, like a sole.

f. Head nearly twice as long as wide; mouth cone reaching nearly across prosternum. ....*Leptothrips* Hood.

ff. Head only a little longer than broad.

g. Mouth cone reaching only to middle of prosternum. *Zygothrips* Uzel.

gg. Mouth cone reaching across prosternum. ....*Phyllothrips.*

dd. Wings of equal width thruout.

e. Cheeks with a few very small warts, each of which bears a small spine.

f. Cheeks nearly straight. *Gynaikothrips.*

ff. Cheeks arched.

g. Post-ocular bristles long and conscpicuous; fore femors of ♂ with two teeth near apex. *Hoplandrothrips.*

gg. Post-ocular spines lacking. *Phloeothrips* Haliday.

ee. Cheeks without such warts.

f. Fore femora not enlarged.

g. Mouth cone acute.

h. Tube short; eyes prolonged on ventral side of head; a pair of long bristles on vertex at inner angles of eyes; intermediate antennal segments obliquely truncate at both base and apex.

Omnatothrips Hood '15.

hh. Tube, eyes and cephalic bristles not as above; antennal segments normal. ......*Liothrips* Uzel.

gg. Mouth cone blunt; individuals very large.

Polyphemothrips Hood and Williams.

ff. Fore femora greatly enlarged.

Horistothrips Morgan '13.

55. *Frankliella tritici* (Fitch). THE GRAIN THRIPS.

A single specimen of the typical species as distinct from the common varieties was swept from Eupatorium ageratoides in November 1918. The antennal segments 2 are typically symmetrical and the measurements agree closely with those given for the species. The spcimen is, however, almost colorless except for the eyes, and the bristles in front of the ocelli are very small. This is the first specimen of the typical species the writer has seen from Florida.

MODERN BEEKEEPING*

By FRANK STIRLING

One of the most fascinating pursuits and one that has shown a remarkable degree of expansion during the past few years is beekeeping. As in the case of other lines of endeavor, the tendency is more towards specialization. Authorities, such as Henry Alley, G. M. Doolittle and Frank C. Pellett, have found that, in order to develop beekeeping up to its present state of perfection, careful selection of the Queen Bee was necessary. The queen bee is the foundation of the community, or colony, because she is eventually the mother of all the bees in the hive. It is therefore necessary that she be vigorous, a rigorous egg layer, and like race horses, well bred.

There are many species of bees. During spring and summer

*Read before the Florida Entomological Society on Dec. 30, 1918.

one can see many different kinds among blossoms and flowers, but most of these are of very little economic importance; their only value lies in carrying pollen from flower to flower, and for this reason they are sometimes called the "Marriage Priests" of the flowers. Higher up in the scale one finds the bumble bees, which not only are useful in pollenizing, but store up very small quantities of honey.

While the number of species of these less important bees is considerable, only those commonly known as honey bees (of the genus *Apis)* are the ones of real importance as honey producers.

Of this genus, the great bee of southern Asia *(Apis dorsata)* has been the subject of considerable interest. This giant bee builds a very large single comb out in the open, generally suspended from the branch of a forest tree. On account of its fierceness, efforts to domesticate it have not met with success.

In Mr. Frank C. Pellett's book, "Practical Queen Rearing", mention is made of a number of other species of bees, of which the most important is the *Apis florea,* a very gentle little bee, much smaller than the common honey bee, and which builds a delicate little comb around a twig.

But of all species, the common honey bee *(Aphis mellifica)* is the only one that has been found of real value as a honey producer. Of this species a number of varieties occur, namely, the Italians, Blacks, Carniolans, etc.

While the Italians are generally accepted as the most valuable bees and are by far the most popular in the United States, some very good results have been obtained by the black bee here in Florida. The Italian has been tried out under all kinds of conditions and has proved the most satisfactory, as it is more gentle than the blacks and is more resistant to certain diseases.

Honey bees are not native to America. The wild bees often seen in Florida are the descendants of those imported. According to the *American Bee Journal,* the first honey bees were imported into Florida by the Spaniards previous to 1763, for they were first noticed in West Florida during that year, and it is quite probable they were brought to this State first, as they were not noticed in any other state until 1780, at which time they were observed in Kentucky; in New York in 1793; and west of the Mississippi river in 1797. The bees introduced by the Spaniards were evidently what is commonly known as the black, or German

(Continued on page 106)

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DR. E. W. BERGER ...... Associate Editor, Acting Business Manager

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Those who would like to see the citrus tree fumigation demonstration being conducted in Florida by the Roessler & Hasslacher Chemical Company should address Mr. Walter S. Lenk, San Juan Hotel, Orlando, Fla.

Reports from the Better Fruit Campaign, being conducted jointly by the University Extension Division, the State Plant Board and the U. S. D. A., indicate much interest and good attendance on the part of the growers.

PERSONALS

Mr. E. E. Wehr, a specialist on insect pests of live stock in the Bureau of Entomology, U. S. D. A., who has been in the State for several weeks on extension work, has left for Maryland.

Mr. A. C. Mason, formerly assistant in the Experiment Station and later in the Plant Board, has just been released from the army and has accepted a position with the Bureau of Entomology. He is to be located at Miami where he will take up the study of the insects of subtropical fruits other than citrus.

OBITUARY OF MEMBERS

Mr. John A. Clinger died at Leesburg, Fla., Oct. 22, 1918.

Mr. B. O. Gaston died at Kissimmee, Jan. 17, 1919.

It is with the profoundest regret that we chronicle the death of these two gentlemen. Each filled his place on the force of the Plant Board and in the Society in a manner which showed an active interest in the agricultural welfare of the State. Both were men of high purpose and sterling character.

REPORTS OF MEETINGS

October 28. Professor P. W. Fattig of the Teachers College and Mr. C. M. Berry of Sanford were unanimously elected to membership in the Society.

Under "Timely Notes" the presence of the Saddle-back Caterpillar on trumpet vine at the Experiment Station was reported by Professor J. R. Watson.

The principal paper of the evening, "Birds and Animals Injurious to Farm Products", was read by Mr. T. Van Hyning. Mr. Van Hyning reviewed the records of a number of birds, and it is his belief that but few are wholly injurious, most of them really being useful in reducing insects. Of mammals, the pocket gopher is the worst and a real parasite. Poisoned water is a remedy for rats in buildings.

The second paper of the evening, by E. W. Berger, was a continuation of the discussion on "Common Names of Insects" conducted at the previous meeting. The following principles were indicated as guides that may be followed by entomologists and others in the selection of common names:

1. Select a name already in use by the growers or others.
2. If there is no common name already in use, the scientific name may be translated wholly or in part. Thus we have Oak Ericoccus for *Ericoccus quercus* (oak), Flocculent Whitefly for *Aleurothrixus floccosa,* Bay Whitefly for *Paralemodes perseae* (bay), etc.
3. Some well defined and readily apparent characteristics may be used; as Woolly Whitefly, Cloudy-winged Whitefly, Long Scale, Chaff Scale, etc.
4. Sometimes the name of the person who described and gave it the scientific name is used as the common name; thus we have Putnam's Scale for *Aspidiotus ancylus* (Putnam). Or the name of the town or locality from which an insect is known may be used as the common name; thus we have Jan Jose Scale for *Aspidiotus perniciosus, Florida Red Scale* and *California* Red Scale for *Chrysomphalus aonidum* and *C. aurantii* respectively.

Scientific names of living things are recognized the world over. In other words, whenever an insect is described and given a scientific name, that is its name from Washington to Tokio, either way around the world. The fact that scientific names are written in Latin, either in Latin words or other words having the Latin endings, probably accounts for their ready acceptance. By using Latin as the language for scientific names, the competition between the many other languages is avoided. Linnaens, the noted botanist, first began the use of two latinized names for plants and animals nearly 200 years ago.

But common names are convenient for local usage, because they are in plain English, easier to spell and pronounce, and absolutely necessary to the economic entomologist who needs to discuss insect problems with many people.

MODERN BEEKEEPING

(Continued from page 103)

bee, and it has been generally supposed that our first bees came from Germany, but Pellett, who is accepted as authority, states that they very probably came from Spain. The native black bees of Great Britain, France, Germany and Spain are said to differ but little.

While the production of honey has for centuries been considered a profitable undertaking, it was not brought to its present state of perfection until such men as A. I. Root, L. L. Langstroth, and a few others, by means of the invention of modern methods, gave it the prominence it now attains. The 8 and 10 frame regulation hive which was invented by Langstroth has been almost universally adopted by progressive beekeepers, thereby making it easier to handle the bees.

Many states have beekeepers' associations, and at their annual meetings the most up to date methods for handling bees are discussed, and such men as E. F. Phillips, Kenneth Hawkins and others from the Department of Agriculture, as well as authorities like C. P. Dadant frequently attend. At the Iowa Experiment Station short courses in beekeeping are annually given, and at the Universities of Missouri and Texas departments of entomology have been offering courses in beekeeping for the regular University students; women as well as men select these courses, and upon completing their University course have pushed beekeeping in their respective communities.

Had it not been for this industry, the whole world would have suffered much more from the lack of sweets than it did during the past months, when war conditions made the amount of sugar available inadequate for the needs of mankind.

Increase in the cost of honey, due to the big export demand created by the war, makes it safe to predict that the coming year will see the greatest effort ever made in furthering beekeeping. During the last half of this year, honey to the value of perhaps $2,000,000 was exported—about 10 times the valuation for any year previous to the beginning of the war—indicating that honey has ceased to be a luxury in the minds of the Allied Peoples.

Also, the home demand for honey has increased. Figures are not available, however, as much of the honey of this country never reaches the larger centers of trade.

The amount of sweet produced by bees is really enormous. Honey is produced in this country, in ordinary years, in excess of two hundred and fifty million pounds. Those plants and flowers from which bees gather nectar are legion, and are scattered throughout the length and breadth of the land. The white-clover belt is the most important honey-producing region, because it furnishes not only the leading commercial honey but also more than one-half of the honey crop of the entire country. This belt extends from Maine to Virginia and westward to the great plains. From white clover alone is secured about one tenth of the Nation's crop of honey. This kind is almost colorless and has a delicate and delicious flavor.

According to the United States Department of Agriculture, alfalfa honey comes second in importance commercially, while sweet clover is third in line of importance. About 4 per cent of the Nation's honey comes from flowers of the cotton plant, 3½ per cent from the bass-wood, 3 per cent from the tulip poplar tree and buckwheat, and 2 per cent from the goldenrod.

California leads all other states in the production of honey. In fact, she produces about 20 per cent of the entire Nation's crop. This is because of the presence of great quantities of mountain sages, together with the fact that the beekeepers of that state have gone into the business in a business-like manner, using modern equipment.

Florida has, until recent years, been backward in her beekeeping industry. There have been, however, some few pioneer beekeepers in this State who have made more than a success of it. The late Mr. O. O. Poppleton was considered one of the foremost veteran beekeepers in the State, and on the East Coast, where he operated, he harvested immense crops of honey from the orange, palmetto and mangrove. Mr. W. S. Hart of Hawks Park, also a Florida beekeeper of prominence, has for years operated an apiary with profitable results in the hammocks along the East Coast. Dr. Edwin G. Baldwin, Professor of Latin at the Stetson University, has for many years made a business of beekeeping, and while it is more a hobby with him, yet it has turned out to be a very profitable one. In fact, he has made himself very prominent as a queen breeder, and his queens, in large numbers, have been sent throughout the North. Mr. H. L. Christopher is now operating two large apiaries in the groves of the Atwood Grapefruit Ranch at Manatee, where the bees were intended primarily for the fertilization of the orange and grapefruit bloom. Mr. A. I. Root, the celebrated founder of the largest bee supply establishment in the world, and one of the foremost authorities on beekeeping, has for years operated apiaries in different sections of the State. Mr. Root spends his winters in Manatee County, and although he is 79 years old, he can still be seen plugging away at his winter home near Bradentown.

Even on the western side of Lake Okeechobee, Mr. C. C. Cook produces some of the most wonderful crops of honey ever heard of (mostly from gallberry).

While the main harvests of honey were formerly produced in the western portion of Florida, in the bottom lands of the Apalachicola and Choclahatchee Rivers, and in the southern portion of Walton County, the opportunities for this industry have in recent years been found present in practically all sections of the State.

The mild winters in Florida tend to make beekeeping more profitable than in the northern and western states. The low cost of operation is largely due to the fact that the bees have a chance to gather a little honey during almost every month. Then there is the large number of honey-producing plants; most desirable of which are the orange, palmetto, tupelo, titi, mangrove, partridge pea, goldenrod, gallberry, Spanish clover, and cotton. (Cotton produces about 32 per cent of all the honey made in the Southern States.)

It is not even necessary to have a farm on which to keep bees; they seem to do just about as well in cities and towns (where the number of colonies is limited) as they do in the country. I happen to know of one gentleman in Jacksonville who has four or five hives on top of a five-story office building, and I have heard of similar instances in Tampa.

Right here within the city limits of Gainesville, which section is not by any means considered well adapted for bee culture, there are to my knowledge 9 men who keep bees; these 9 men have a total of 48 colonies and there are undoubtedly others. As a rule, these gentlemen have had very good harvests of honey during the past year. One of them, who has but 2 colonies, made 172 pounds of surplus honey and comb. My own bees (I have six hives in my back yard) made an average of 70 pounds surplus per colony this past season; and one of them, a ten-frame hive, made a little over 100 pounds.

Bees, if permitted to swarm naturally, will increase about double each year, although some will swarm more than that, so when a beginner starts out with one or two colonies, it is not many years before he has quite a large sized apiary. The cost of operation, with a few colonies, is very little, and the time required for their care is of no real importance.

It is advisable that those who anticipate going into the business of keeping bees should start out with not more than one or two colonies, learning all they can about it while their colonies are increasing. In order to secure the best information on the subject, it is advisable to subscribe to some one of the bee journals published in this country and to secure some text book, such as "A. B. C. and X. Y. Z. of Bee Culture". Bulletins on beekeeping can also be obtained free of charge from the Department of Agriculture, Washington, D. C. Failures have been made by some who started in on too large a scale, not having the needed experience required in handling large numbers of hives. The subject is one that should be thoroly studied, and one finds that the deeper he gets into it the more interesting it becomes. As stated before, the first question is that of selecting good stock; then it is necessary that the bees should be properly housed in regulation hives, using comb foundation for the purpose of keeping the honey comb straight. Regardless of the opinion expressed by some, the old fashioned hive, or "gum", should never be considered, as it has been conclusively proven unprofitable. The entrances to the hives should be so adjusted as to assist the bees in protecting themselves from their enemies, and care should be taken to so place the hives that they will have the proper amount of shade and ventilation.

The up-to-date beekeeper is not only an operator of his apiary, but a co-operator with his bees, and it seems that the bees soon become educated by the partnership as well as the beekeeper. By this co-operation and co-education of bees and beekeeper, together with an increased interest in the business and with sensible up to date handling, the result will be a development of honey production now scarcely dreamed of.

WANTED—Diurnal Lepidoptera of Florida in exchange for desirable western species. Over 3000 butterflies on hand for exchanges. Dr. John A. Comstock, Southwest Museum, Los Angeles, Calif.

WANTED—To buy or exchange for northern species, southern Chrysophidae (Lace-winged-flies). All stages desired, especially material for biological studies. Will determine specimens. Dr. Roger C. Smith, U. S. Ent. Lab., Charlottesville, Va.

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A DAY WITH THE WILD PLUMS

(Feb. 22, 1919)

For perfect bliss give me a day like this, clear, bright, and warm, but not too hot, a thicket full of bloom and insects, a net, and a holiday. The sun's rays fall cheerfully on coatless back and hatless head; the scent of the blossoms thrills the nostrils and the busy hum of insects the ears. Such a day and place will quickly drown all care and worry, the blues, a hard cold, and almost an appetite for dinner if one has to forsake the thicket to get it. For this will be our last chance, as the trees are fast dropping their petals. A few more days and the humming host will have dispersed to other hunting grounds hardly to meet again in such a notable gathering until the chinquepin blooms, in late April or May. For the wild plum is a democratic blossom, its nectar and pollen are open to all comers from the lordly Yellow Swallow-tail *(Papilio turnus)* or the even larger butterfly of the Orange Dog *(Papilio cresphontes)* to the minutest fly or thrips. Not so all blooms. Look, for instance, at that Red Bud, *Cercis Canadensis*. An exclusive aristocrat, its sweets are locked up from the common herd in a corolla of rigid petals which only the stronger bees (honey- and bumble-bees) can force apart. The charming Yellow Jasmin is only a little less aristocratic. Its voluptuously scented vase is accessible to only the long sucking tubes of some of the larger butterflies. I note only the Yellow Swallow-tail and the black and white *Papilio ajax*. Poor pickings for an entomologist at either of these plants, so let us back to the Wild Plum.

Most conspicuous among the busy throng are the butterflies. The tree is the Mecca for most of those that have emerged to date. The Swallow-tails *(Papilios)* have just commenced to appear. Besides Turnus and the Orange Dog, Ajax is here, the Green-clouded Spice Bush *(P. troilus)* and the blue Pipe Vine *(P. philenor)*. Almost as large as the Swallow-tails but tailless, the Red-Spotted Purple *(Basilarchia astynax)*. Smaller but still of good size is the variegated Thistle Butterfly *(Pyrameis cardui)* and the dark brown Buckeye *(Junonia coenia)* with six peacock eyes, a quarrelsome chap, ever ready to engage in combat with a butterfly twice his size. Of the smaller species, an inch or so across the wings, the pretty little Hair Streaks are common but not conspicuous. They get their name from the delicate hair-like "tail" on the hind wings. They are quiet fellows and stick closely to the blossoms. The largest is *Uranotes melinus*. Its larva is the Cotton Square Borer which also mines loquat buds. *Atlides halesus* is about as large and has perhaps the most beautiful irridescent blue wings of them all.

Darting restlessly from bloom to bloom are several species of skippers: *Thanaos horatius, Lerodea maculata, Thanaos petronius, Catia drury.*

But tastes differ, even in butterflies. Not all of them care for the wild plum. The Long-tailed Skipper, the adult of the Bean Leaf-roller, *Eudamus proteus,* stops for a moment but soon flies on to the few belated blossoms of the catnip over which he lingers long. Like the catnip, this butterfly is a relic of last year's vintage, a straggler which has lived thru the winter rather than a spring addition to our fauna. The Cloudless Sulphur *(Catopsilia ebule)* too is restlessly roaming the woods today but stops at the plum for but a moment. The Monarch *(Anosia plexippus)* and the orange Nicippe pay but little more attention to the blossoms.

There are a few day flying moths about the blooms. The pretty pink and white Bella Moth *(Utethesia bella)* is here in some numbers considering the time of the year; they too are creatures of the fall.

But the catch of the day is a pair of *Psychomorpha epimenis.* It is a rare moth here. I have never seen it before and it has been reported but once from the state. At first glance, as I saw them in the top of the tree, I mistook them for an old friend, the Orange Tip Butterfly, whose acquaintance I first made in a warm south-facing canon in the Sandia Mountains of New Mexico, to visit which I traveled fifteen horizontal miles and half a vertical one. But my reward was ample. In spite of the great difference in the setting, the clean-cut towering Rockies with their exhilarating air in place of the flat landscape draped with Spanish moss and enveloped in a dreamy haze, the insect visitors were much the same, at least as far as orders and families. The calendar said April instead of February, but, as in my garden today, the peach trees were pink with bloom. But they grew in irrigated orchards with a vivid green carpet of alfalfa.

But not all the lepidoptera here are adult visitors. Some are "at home" here, feeding on the leaves. My net gathers several unknown species of "measuring worms", Geometrid larvae; but most conspicuous are the Tent Caterpillars, *Malacosoma americana.* The first warm February days that enticed forth from their winter buds the first tender leaves hatched out these caterpillars. Very quickly they will complete their growth, pupate, and issue as moths to lay their eggs in a bunch around the twigs. Here, protected from rain by a heavy coating of varnish, they will remain all summer and winter. Why only a single brood a season, when there is time for a half dozen? Many other insects, which can find time for but a single generation in the North, produce two or three in the South. Why not Malacosma? Why this neglect of opportunity? Is it that the insect is, geologically speaking, a recent arrival from the North and has failed to change its habits?

Next to the Lepidoptera, the Hymenoptera are most conspicuous. The major part of the busy hum is due to the honey bees. This is their first good "feed" of the spring and they are making the most of it. The wild bee, Agepostenon (?) is here, a beautiful irridescent blue and green fellow, but a lazy profiteer, a parasite on more industrious bees in the matter of raising a family.

The bumble bees are here. Prof. Fattig reports four species: *Bombus fraternus, pennsylvanicus, impatiens,* and *separatus.* But few wasps are about as yet. The common Mud Dauber, *Polistes,* is here as everywhere and a number of Digger Wasps. Of the others I have identified only *Odynerus capra.*

Diptera, the two-winged flies, are the next most abundant group, particularly *Syrphidae.* Prof. Fattig, who paid especial attention to this group, took fourteen species on this date from the blossoms of the wild plum. His list, as far as identified, follows: *Eristalis tenax, E. dimidiatus, E. vinetarum, E. transversus, Helophilus latifrons, Allograpta obliqua, Syrphus americana, Tropidia quadrata, Syritta pipiens, Psilota buccata, Tem-*

nostoma sp., Melanostoma sp. There are a number of Blue-bottles and Green-bottles about, especially the little *Orthellia cornicini.* There are a few Tachinid Flies about too, the most common being *Archytas lateralis,* built on the plan of a Blue-bottle, but hairy.

Beetles do not seem to be particularly attracted to the wild plum. The common little Soldier Beetle or Firefly, *Chauliognathus marginatus,* is of course, here. From now to late November hardly a blossom will appear that will not be overrun with these. Here too is the adult of the Southern Corn Root Worm, the "Bud Worm" of the Carolinas and Georgia, *Diabrotica 12-punctata.* We Floridians reserve the name "Bud Worm" for the first generation of the Corn Ear Worm. The "Black Weevil" of corn, *Calandra oryzae,* is here too. I take some pretty little bronze colored Chrysomelids, *Monachus thoracicus,* and large numbers of a minute Chrysomelid and an equally small weevil as well as a *Bruchus.*

Neither are true bugs much in evidence. There is an occasional Stink Bug, Pentatomid, mostly *Euschistus servus* and *E. variolaris,* and a Capsid or two are met with. The Green Peach Aphid, *Myzus persicae,* is common and the minute predator *Triphleps insidiosus,* which is to be found in most blossoms, is here in small numbers feeding on plant lice and thrips.

ADDITIONS TO THE THYSANOPTERA OF FLORIDA—V

J. R. WATSON AND EVELYN OSBORN

29. *Haplothrips orlando,* n. sp.

FEMALE. Length 2 mm. Color, including the entire antennae, uniformly dark brown, with considerable reddish-brown hypodermal pigmentation.

Head nearly a third longer than wide, surface striated; cheeks slightly arched and converging posteriorly, roughened with minute elevations and set with a few hairs; post-ocular spines rather long and slender but pale. *Eyes* rather small, occupying little more than a third of the profile of the head. Posterior ocelli large, situated opposite the middle of the eyes and in contact with their margins, directed partly outward. Anterior ocellus directed forward. *Mouth-cone* shorter than its width at the base, scarcely reaching the middle of the prosternum, rounded. Antennae about 1.5 times as long as the head, segments unusually uniform in size, shape and color; hairs short and weak.

Prothorax but little more than half the length of the head, 2.5 times as wide as long, sides widely diverging posteriorly; posterior angles rounded, each bearing a medium-sized bristle on the posterior border and a shorter one in front of it; two minute bristles on the anterior border near the middle. *Legs* rather long, concolorous with the body; fore femora greatly enlarged; all femora with a small, stout anteriorly directed, triangular tooth at the apex within. Fore tarsi with a very large strong tooth within. This tooth is nearly as large as the rest of the tarsus.

Wings reaching abdominal segment 6 or 7; membrane clear, distinctly narrowed in the middle; 23 interlocated hairs on the margin of the fore pair.

Abdomen widest at the base of the first segment, thence rounding to the base of the rather large tube; no conspicuous bristles on the anterior segments, those on the posterior about as long as the tube but pale. Those at the end of the tube pale and slender of medium length, the longest over half the length of the tube.

Measurements: Head, length 0.3 mm., width 0.21 mm.; prothorax, length 0.17 mm., width, including coxae, 0.42 mm.; Pterothorax, width 0.45 mm.; abdomen, width 0.5 mm.; tube, length 0.19 mm., width at the base 0.07 mm., at the apex 0.038 mm. Antennal segments 1, 27; 2, 57; 3, 67; 4, 64; 5, 67; 6, 59; 7, 56; 8, 43 microns; total length 0.47 mm.

Described from a single female taken in sweeping shrubs in the "flat woods" near Orlando, Fla., Feb. 1919. It resembles *H. jonesii* Karny in size, color, antennae and the presence of the femoral teeth, but differs in numerous characters including the size of the spine on the fore tarsi, short mouth-cone, and absence of spines near the base of the femora below.

Type in the Experiment Station collection.

KEY TO THE NORTH AMERICAN SPECIES OF HAPLOTHRIPS
(Seville) (Anthrothrips *Uzel)*

I. Post-ocular spines wanting. Antennae almost uniformly brown except segment 3 and base of 4 which are light brown.
H. statices Haliday *(Anthothrips niger* Osborn)

II. Post-ocular bristles well developed.
- a. Post-ocular bristles and most of those of the thorax knobbed.
  - b. Sides of the head set with minute spines, surface roughened; fore tarsus with a large tooth; 10 to 12 accessory hairs on the fore wing .... *H. flavipes* Jones.
  - bb. Sides of the head with a few inconspicuous bristles.
    - c. Head faintly sculptured; no accessory bristles on fore wing; tibiae brown ....*H.* (?) *Bellus* Hood & Willlams.
    - cc. Head faintly striated; 7 accessory bristles on fore wing. .... *H. dozieri* (Watson.)
    - ccc. Head almost free of sculpture; 3 or 4 accessory bristles on fore wing; tibiae pale yellow.
    H. (?) *tibialis* Hood.
- aa. Post-ocular bristles not knobbed.
  Apex of femora with small anteriorly directed tooth within.
    - c. Antennae uniformly dark brown; terminal bristles shorter than the tube.
      - d. Tarsal spine short; width of prothorax less than 2 times the length. *H. jonesii* Karny
      (A. nigricornis Jones.)
      - dd. Tarsal spine very large; width of prothorax 2.5 times its length .... *H. orlando* n. sp.

cc. Antennal segment 3 yellowish brown; terminal bristles longer than the tube.
 d. Body length 1.8 mm.; antennae nearly concolorous with the body; tube nearly as wide at the apex as at the base ....*H. haplophilus* Hood.
 dd. Body length 1.3 mm.; antennae much lighter than the body; tube about 1.5 as wide at the base as at apex ....*H. floridensis* (Watson.)

bb. Apex of femora toothless.
 c. Width of tube at base more than 1.5 width at apex.
 d. Wings clear, except a brownish area at base.
 e. Antennae twice as long as head, usual sense cones present on segment 3.
 f. Bristles on the anterior and posterior margins of prothorax about equal.
 g. Antennal segments 3-6 bright yellow, abdominal spines (except those of the tube) slender and faint; prothorax about 1.5 times as wide as long.
 H. verbasci (Osborn.)
 gg. Antennal segments 3-6 light brown or yellow; abdominal spines stout and conspicuous; prothorax about twice as wide as long.
 H. variabilis (Crawford.)
 ff. Bristles of the anterior margin of the prothorax much shorter; forewings without interlocated hairs.
 H. malifloris Hood.
 ee. Antennae less than twice as long as head, no sense cones on inner surface of segment 3; bristles of anterior margin of prothorax greatly reduced.
 f. Only antennal segment 3 yellow, a little shorter than 2; wings with 7 interlocated hairs; prothorax less than twice as long as wide.
 H. graminis Hood.
 ff. Antennal segments 3-6 yellow, 3 longer than 2; 9 interlocated hairs on wing; prothorax more than twice as wide as long....*H. faurei* Hood.
 fff. Antennal segment 3 yellow, 4-6 progressively darker, segment 3 distinctly shorter than 2. (Panama)
 H. humilis Hood.

dd. Wings clouded with gray, a nearly black area at the base and a paler one just before the middle, 2 interlocated hairs. *H. nubilipennis* Hood.

cc. Width of the tube at the base less than 1.5 width at apex. (W. I.) .... *H. gowdeyi* Hood.

No. 29 of our previous list (Buggist, Vol. I, No. 4, p. 71) *Anthothrips niger* Osborn, is synonymous with No. 45 *Haplothrips statices* Haliday. We have therefore given the new species No. 29.

56. *Frankliniella insularis* (Franklin). Miami, Mar. 1919. Collected by A. C. Mason on flowers of *Citrus* and *Carissa grandiflora*. This thrips is widespread thru Mexico and the West Indies.

PERSONALS

Thomas H. Jones of the Bureau of Entomology, Division of Truck and Garden Crops, stationed in Louisiana, is in the state for a few weeks in connection with extension work on the melon aphis.

Mr. Fiske of the Columbia, S. C., laboratory of the U. S. Bureau of Entomology was a recent visitor at Gainesville in connection with some work on corn insects that is being carried on in cooperation with the Experiment Station. Mr. Fiske is a classmate of Mr. Geo. B. Merrill of the Plant Board.

Mr. Merrill has been passing the cigars—a young entomologist.

Miss Evelyn Osborn is a temporary assistant in the Department of Entomology of the Experiment Station. Miss Osborn is a daughter of Prof. Herbert Osborn, the noted entomologist of Ohio State University.

Farmer's Bulletin 1029, "Conserving Corn from Weevils in the Gulf Coast States", by E. A. Back, contains some data and photographs obtained by Mr. R. L. Clute here in Florida last summer.

W. S. Blatchley in Canadian Entomologist, Vol. LI, No. 3, p. 65, treats of "Some New or Scarce Coleoptera from Florida". We are able to add a new locality and two host plants to one of the species he mentions. *Tachygonus lecontei* Gyll has been taken at Gainesville from holly and prickly ash. Dec. 2 and April 18.

The Business Manager of THE BUGGIST spent ten days during last February assisting in the Better Fruit Campaign in Florida.

The
FLORIDA BUGGIST
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PROF. J. R. WATSON..Editor
DR. E. W. BERGER..Business Manager
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According to the daily papers the city of West Palm Beach has undertaken a systematic campaign against mosquitoes. We trust that the movement is backed by trained men and will be such a success as to serve as an object lesson to the rest of the state. At least by this highly sensible and progressive action that city has been placed in a class by herself among Florida cities. May her tribe increase. May her hotels fill with tourists and her real estate men flourish as her own bay trees.

The Entomologist of the Experiment Station was recently called to Florence Villa to advise in regard to combatting mosquitoes.

Our most enthusiastic bee man while out on a pleasure ride on a recent Sunday afternoon espied a swarm in a tall tree. Seizing his wife's linen duster he climbed the tree, wrapped up the colony and carried it safely home. Wonder what his go-to-meeting (?) trousers look like?

THE CUBAN CITRUS THRIPS IN FLORIDA

In a collection of thrips recently received from Miami from Mr. A. C. Mason are numerous specimens of *Frankliniella insularis* (Franklin). This is by no means a welcome addition to the "bugs" of Florida. Not much is recorded in economic literature concerning this insect but from what we have been able to gather from men who have worked in Cuban groves it would seem that it is a much more serious pest than is our Florida Flower Thrips and that spraying for it is a more or less regular procedure in the Isle of Pines. An effort will be made to discover how widespread this insect is in Florida and a close watch will be kept on its comings and goings.

REPORTS OF MEETINGS

Nov. 25, 1918. Under "Timely Notes" Professor Watson exhibited a collection of several hundred moths of the Velvet Bean Caterpillar *(Anticarsia gemmatilis)* which shows unusual variation in color and markings. Professor Watson also reported severe attacks on citrus and avocado fruits by the cotton stainer at Miami.

In the first paper of the evening, "The Sweet-potato Root Weevil *(Cylas formicarius)* Situation", Mr. Bragdon gave an account of the attempt to eradicate this pest from Baker County. This comparatively small infested area was selected for three reasons: (1) isolation; (2) absence of wild host-plants of the weevil; (3) climate, all potato vines being killed by cold during the winter.——The Bureau of Ent. U. S. D. A. has established a laboratory at Macclenny which will attend primarily to the eradication work. The Plant Board's share in the work consists principally in maintaining the necessary quarantines. One or two growers who cooperated from the very beginning have apparently already cleared their farms of weevils. The method of procedure is, in brief: (1) to collect and destroy the last vestige of potatoes at digging time; (2) to sort and destroy all infested potatoes at digging time; (3) to dispose of all potatoes by February in order to starve out the weevils; (4) to plant vines free of weevils and to plant late; (5) to locate this year's fields as far as possible from those of last year.——Mr. Bragdon exhibited a map showing the infested regions—Texas, Louisiana, Alabama (Mobile Co.), and Georgia. Another map showed a narrow infested strip, five to eight miles wide, bordering the coast from Tarpon Springs on the west to Ormond on the east coast. Above those points on each side there is a break in the distribution of the sea-side morning-glory, the native host-plant of the weevil. This apparently accounts for the absence of the weevils on the beaches north of those points.

The second paper of the evening was by Dr. Berger, who gave a brief account of the larvae, pupae and adults and showed specimens of one of the Soldier Flies *(Stratiomyidae)*. These dirty gray maggots and dark brown leathery, active, pupae were found living in the droppings of chimney swallows that had accumulated to the volume of about half a hushel on a ledge inside the chimney just above the fireplace. The droppings, apparently made up mostly of insect remains, were quite alive with several sizes of these larvae and pupae. The species was identified by Prof. Watson as *Hermetia illudens* SC, a common scavenger in rotting potatoes and insects. The adult Stratiomydae are reported as frequenting flowers, but in the larval stages as living in decaying vegetable matter.

Both papers were discussed by those present.

Dec. 30. Under "Timely Notes" Prof. Watson directed attention to the scarcity during the past fall of a group of tropical insects which extend into the southern U. S. including the Zebra Butterfly *(Heliconius charithonia)*, the Bella Moth *(Utethesia bella)*, and the Gulf Fritillary *(Agraulis vanillae*, and *Anticarsia)*. He is of the opinion that the severe winter of 1917-18 may be the cause of the scarcity of these tropical species.

Mr. Stirling stated that the Cotton Stainer was causing unprecedented injury to citrus fruit this fall and winter, especially in Polk and DeSoto Counties.

The paper of the evening, "Modern Bee Keeping", by Frank Stirling (published in THE BUGGIST, Vol. II, No. 3), was next read and discussed.

Jan. 27, 1919. H. S. Davis in the chair. The annual election of officers resulted: President, F. M. O'Byrne; vice president, Geo. B. Merrill; secretary-treasurer, P. W. Fattig; executive committee, Dr. J. H. Montgomery; editor of THE FLORIDA BUGGIST, J. R. Watson; associate editor, Wilmon Newell; business manager, E. W. Berger.

Under "Timely Notes" Mr. Frank Stirling reported finding two specimens of the Palmetto Weevil *(Rhyncophorus cruentatus)* in a bud of cabbage palmetto which he cut for eating while on a hunting trip on the Suwannee River a few miles south of Vista, in Levy County. Prof. Watson reported finding the Big-legged and the Leaf-footed Plant-bugs *(Acanthocephalus femoratus* and *Leptoglossus phyllopus)* hibernating in large numbers in the large thistles so common in pastures. These thistles should be cut during the winter.——Mr. Bragdon reported finding *Euscepes porcellus* on moonvine on the shores of Lake Okeechobee and on seaside morning-glory at Ft. Pierce; and the Sweet-potato Root Weevil on sweet-potatoes at Titusville.

Mr. R. L. Warner read the paper of the evening on "Side Lights on the Black Fly in Cuba". Mr. Warner served from Feb. to Aug. 1918 in Cuba in an advisory capacity to the Cubans in their efforts to control this aleurodid *(Aleurocanthus woglumi)*.

REPORT OF THE SECRETARY-TREASURER FOR 1918

RECEIPTS

Balance received from previous Secretary-Treasurer	$16.95
Dues received to January 27, 1919	46.50
Total receipts	$63.45

EXPENDITURES

100 Notice-Dues Cards, Pepper Printing Co.	$ 1.50
Stamps	1.25
3 Rubber Stamps, Balbin Stamp Co., Tampa	.87
125 Notices of dues due	2.35
The Florida Buggist, printing, Mar., June, and Sept. Nos.	56.35
Total expenditures	$62.32
Balance on hand	1.13
	$63.45

E. W. BERGER, Sec'y-Treasurer.

March 3, 1919. The Society was called to order by the President with the following members present: E. W. Berger, F. M. O'Byrne, G. B. Merrill, J. R. Watson, P. H. Rolfs, Frank Stirling, J. E. Graf, E. K. Bynum, J. Chaffin and H. S. Davis. Visitors present were Miss Evelyn Osborn and C. H. Popenoe of the Bureau of Entomology, Washington. The following were elected to membership: Dr. Roger C. Smith, U. S. Ent. Lab., Charlottesville, Va., and E. K. Bynum, State Plant Board, Gainesville, Fla. The resignation of P. W. Fattig as secretary-treasurer was read and accepted and Dr. H. S. Davis was elected to succeed him.

Mr. G. B. Merrill then read a paper on "Some New Florida Scales". Since the publication of the paper on "Some Florida Scale Insects" by C. E. Wilson in the Quarterly Bulletin, State Plant Board, Oct. 1917, 11 additional species have been found in the state. The more important facts regarding each species were briefly summarized. (This paper will be published in the Quarterly Bulletin State Plant Board.)

This was followed by a paper on "Mealy-bugs" by J. Chaffin. Less work has been done on these insects than on any other group of the Coccidae. About 76 species have been described—43 of them from California. Practically no work has been done on these insects in Florida and there are probably fully as many species in the state as in California. Five species have already been collected from citrus.

Mar. 22, 1919. In place of the regular March meeting a smoker for Mr. George Compere, Plant Quarantine Inspector of California, was held. The following members were present: F. M. O'Byrne, E. W. Berger, Wilmon Newell, O. T. Stone, J. C. Goodwin, Frank Stirling, J. H. Montgomery, A. C. Brown, J. Chaffin, G. B. Merrill and H. S. Davis. There were present as guests George Compere, J. C. Holton, J. R. Fulk, Jno. Spencer, J. J. Grimm, C. H. Willoughby and Mr. F. S. Dresskell of Chicago. The regular order of business was dispensed with and Mr. Compere gave an informal and exceedingly interesting address on "Parasitic Insects". This consisted largely of personal reminiscences of his work in introducing insect parasites into California and Australia, following the introduction of the Vedalia, or Australian Lady-beetle, to combat the Cottony Cushion Scale in California in 1888.

Roughly speaking, a species is a collection of individuals which resemble each other as closely as the offspring of a single parent.—Comstock.

A genus is a group of species. Thus all the species of pine trees belong to the genus *Pinus*.

Observation, record, generalization, experiment, verification—these are the processes necessary for the mastery of this subject.—Forbes.

A "BAT" FOR A "RACET WILD ANIMAL"

The following, contributed by a farmer on the shores of Lake Okeechobee, may prove valuable to those similarly afflicted: "dear sir,

Please Regard Rabbits & Rats Poisoning How is To Best Uising Bats (baits) For This Racet Wild Animal Eated All Plant Up and Digging All Seed Out Peanuts Corn Broom Corn Just Think Digging Out Corn Plant From Two To Three Weeks Old. * * * * *

Since This Rats Eated Seed Bad I Go Over A Bout 30 Acre Two Week Head Before Plant Corn With Poison Bats Paris Grien and Arsenata Of Lead Arsenic Zing Together Corn Meal And Indian Pomckins Coked And Hed One Pound Sugar & One Quart Surp To One Peck Poison Bats Distributed Two Time A Week And I Did Seved 20 Acre Corn. * * *

Yours Veriy Truly,

________ __________."

WANTED—To exchange insects of Michigan, preferably Lepidoptera, for insects from Florida. W. C. Platt, 625 Wallace Ave., Kalamazoo, Mich.

STRATEGUS WANTED—Am making a special study of this genus, of the Scarabeidae, and should be very glad to receive Florida specimens, especially of the rarer specie. Will exchange or pay cash. Address W. Knaus, McPherson, Kansas.

Insects are eminently instructive, though their automatic behavior is often so remarkably successful as to appear rational, instead of purely instinctive.—Falson.

Perhaps, after all, it was just a happy thought that prompted the wasp to grab a pebble in its jaws and with it tamp the earth over its burrow.—E. W. B.

WANTED—Diurnal Lepidoptera of Florida in exchange for desirable western species. Over 3000 butterflies on hand for exchanges. Dr. John A. Comstock, Southwest Museum, Los Angeles, Calif.

WANTED—To buy or exchange for northern species, southern Chrysopidae (Lace-winged-flies). All stages desired, especially material for biological studies. Will determine specimens. Dr. Roger C. Smith, U. S. Ent. Lab., Charlottesville, Va.

E. O. Painter Fertilizer Company

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Official Organ of the Florida Entomological Society

VOL. III — SUMMER NUMBER — NO. 1

JUNE, 1919

A NEW SPECIES OF VELIA FROM FLORIDA (HEM.-HET.)*

By CARL J. DRAKE

While collecting insects about two miles southwest of Gainesville, Florida, during the summer of 1918, the writer found numerous specimens of a species of a water-strider in an old swamp. A study of this material indicates the insect to be an undescribed species of the genus *Velia,* family *Veliidae.* The species is very closely allied to *Velia stagnalis* Burm. Mr. W. L. McAtee has very kindly compared a male and female with his series of *V. stagnalis,* collected in the vicinity of Washington, D. C. The insect is named in honor of Prof. J. R. Watson, who has taken a great interest in Florida insects.

Velia watsoni new species.

Head formed as in *V. stagnalis* Burmeister, the smooth impressed median line quite distinct. Eyes globose, strongly faceted. Antennae long and slender; basal segment curved, much stronger, also two-sevenths longer than the second; the second a little stronger than the third; the second, third and fourth about equal in length. Pronotum very coarsely punctured, longitudinally carinate in the middle, produced and rather narrowly rounded posteriorly, the tubercles large and prominent. Metapleura with the upward projecting spines visible from above, located, as in *stagnalis,* about the middle. First and second abdominal segments (dorsal surface) with a lateral carina on each side. Legs long and rather stout, the under surface of femora and tibiae denticulate; length of tarsi and tarsal segment proportioned about the same as in *stagnalis.* Antennae, legs and body pilose and setigerous, the hairs along the posterior margin of the pronotum becoming rather long. Length, male 4.2 mm. and female 4.1 mm.; width, male about 1 mm. and female 1.12 mm.

Color: General color dark or blackish brown. Legs pale luteous, the bands varying from light brown to fuscous. Eyes black. Antennae pale

*Contributions from the Department of Entomology, New York State College of Forestry, Syracuse University, Syracuse, New York.

brown to brown. Pronotum brown, the posterior portion becoming yellowish brown in the female. Abdomen dark brown, the venter blackish; connexivum (male) with a yellowish brown spot on the anterior portions of each of the last three abdominal segments and the entire connexivum lighter with more prominent markings in the female.

Described from numerous specimens, collected during the summer of 1918 near Gainesville, Florida. *Type* and *allotype* in my collection. *Paratypes* in the Florida Experiment Station, Museum of the University of Florida and my collection. The eggs are deposited on floating aquatic plants and floating sticks or wood just beneath the surface of the water. The species is predaceous and lives in stagnant water. The macropterous form is unknown. The insect very closely resembles *Velia stagnalis* Burm. from which it may be distinguished by its darker color, the much more prominent tubercles in the pronotum and the much longer antennae. The first antennal segment in *V. watsoni* is much longer than the first antennal segment in *stagnalis*, the first segment in the latter and the second segment in the former being equal in length.

Velia stagnalis Burmeister.

Van Duzee (Cat. Hem. of Amer. North of Mexico) records this species from Pennsylvania, District of Columbia, North Carolina and West Indies. I have two specimens from Sandusky Bay, Lake Erie (collected by V. R. Haber) and four from Rockbridge, Ohio (collected by A. J. Bassinger). The Ohio specimens were collected in stagnant water; they agree perfectly in form and color with a specimen from District of Columbia that Mr. McAtee has kindly presented to me.

ADDITIONS TO THE THYSANOPTERA OF FLORIDA.—V.

J. R. WATSON

A collection of thrips from Mr. A. C. Mason of Miami, contains two new species and a new variety as follows:

57. *Dictyothrips floridensis*, n. sp.

General body color dark brown, legs and antennae light brown. Head and thorax deeply reticulated.

Measurements: Total body length 1.00 mm. Head: length 0.10 mm., width 0.15 mm.; prothorax: length 0.11, width 0.16 mm.; mesothorax: width 0.24 mm.; metathorax: width 0.20 mm.; abdomen: width 0.23 mm.; antennae: segment 1, 24; 2, 40; 3, 50; 4, 40; 5, 48; 6, 58; 7, 16; 8, 24 microns; total length 0.267 mm.

Head 1.5 times as broad as long; cheeks strongly arched, sparsely pilose; front with a median ridge, extending well forward, forming a right angled projection between the antennae. Bristles: two postocular, one in front of each posterior ocellus, and a row of four across the frons in front of the anterior ocellus; all short, but with bright-colored conspicuous bases. *Eyes* very large, occupying ⅔ of both the length and width of the head, markedly bulging, sparsely pilose, facets very large. *Ocelli* very large; the posterior pair situated about the middle of the border of the eyes, anterior facing forward. *Antennae* 2.5 times as long as the head; segments 1 and 2 dark brown, concolorous with the head, and 3 and 4 yellowish brown, others light brown; 2 much wider than the others, 6 longest; sparsely provided with bristles.

Mouth cone short and sharp pointed.

Prothorax about the size of the head, sides convex and roughened with rather large papillae and bearing a few short, recurved bristles. A rather long and stout bristle on each posterior angle.

Mesothorax abruptly widened (the widest part of the insect), sides very convex and set with papillae and short bristles like the prothorax.

Mesothorax much narrower, sides nearly straight, slightly diverging posteriorly. *Legs* long and slender, light brown, distal part of femora and proximal part of tibiae darker; tarsi and distal part of tibiae very light brownish-yellow; provided with numerous slender bristles.

Wings reaching the tip of the abdomen; membrane slender, dark brown, except the extreme base which is clear, and clothed with numerous short hairs. Anterior margin provided with 14 exceedingly long and stout spines with colorless, dilated tips and arising from thickened bases; anterior vein with 11 spines nearly as large; posterior vein with none, scale with two. Veins inconspicuous. Marginal fringe sparse, lacking from the basal half and the extreme tip of costal margin.

Abdomen rather abruptly widened to the third or fourth segment and from there gradually narrowed to the tip. Spines on the posterior segments moderately long.

Described from many females taken on young guava plants in a greenhouse at Miami by Mr. A. C. Mason on June 10. Type in the author's collection.

Male not seen.

Related to *D. reticulata* but differing in many characters.

58. *Cephalothrips elongata*, n. sp.

Head, thorax, and tube dark reddish brown; abdomen, hind and middle legs and fore tibiae and tarsi and antennal segments 2-5 pale yellowish brown. Base of fore femora and antennal segmental, 6, 7 and 8 darker.

Measurements: Total body length 1.9 mm.; Head: length 0.224 mm., width 0.129 mm.; prothorax: length 0.147, width 0.240 mm.; mesothorax: 0.230 mm.; abdomen 0.240 mm.; tube: length 0.114 mm., width at base 0.058 mm., at apex 0.032 mm. Antennae: segment 1, 40; 2, 45; 3, 53; 4, 56; 5, 45; 6, 40; 7, 45; 8, 27 microns; total length 0.33 mm.

Head nearly twice as long as wide; cheeks nearly straight and parallel (converging slightly posteriorly) for the first ⅔ of their length and then slightly constricted. Postocular bristles long and slender but pale, with colorless dilated tips; a small bristle behind each posterior ocellus and another near posterior median corner of each eye. Vortex smooth. *Eyes* medium sized, elongated obliquely inward and backward on dorsal surface, dark, not protruding. *Ocelli* large but pale, posterior ones situated near the middle margin of eye, anterior directed forward. *Antennae* nearly 1.5 times as long as the head. Segments 2-5 quite uniform in size and color, bristles short and colorless, very inconspicuous. *Mouth cone* very short, not reaching the middle of prothorax.

Prothorax triangular, posterior angles rounded and bearing each a pair of stout but short bristles with dilated tips; a similar bristle on each anterior angle and two along each side.

Pterothorax narrower, sides nearly straight, converging posteriorly; bearing a few pale, slender spines. *Legs* long and slender; anterior femora somewhat enlarged; fore tarsi with a rather conspicuous thumb-shaped forward-directed tooth; a few slender colorless bristles near distal end of tibiae. *Wings* short, scarcely reaching the middle of the abdomen, membrane narrow, pale, marginal hairs rather long.

Abdomen remarkably long and slender, more than twice as long as the head and thorax together. Spines on the anterior segments few and colorless but rather long, becoming longer and darker posteriorly.

Described from a single female collected from a Barnacle Scale *(Ceroplastes cerripediformis)* at Miami, Fla., by Mr. A. C. Mason.

Type in the author's collection.

This thrips is easily recognized by its remarkably long light yellowish abdomen.

Among the collection of thrips taken in and around Miami by Mr. A. C. Mason are numerous specimens of a Frankliniella which was identified by Mr. A. C. Morgan as close to *F. Cephalica* (Crawford). It differs, however, from the description of that species in many characters and would seem to merit at least varietal distinction. F. cephalica was described from Mexico and has never been reported from Florida.

59. *Frankliniella cephalica masoni*, n. var.

Differs from the description of the species (Thysanoptera of Mexico and the South II. Pomona College Jl. of Ent. Vol. II, No. 1) in the following characters:

Postocular spines short but heavy, the smaller ones absent. Eyes dark orange red. Ocelli large, pale yellow, bordered with deep orange crescents, situated further forward than in Crawford's figure. Antennal segment 1 and basal half of 2 yellow, concolorous with the head; 5, basal half of 4, and most of 3 grayish, almost colorless; remainder light brown.

Posterior angles of the prothorax not as broadly rounded as in Crawford's figure, the two stout spines sharply recurved. The spines on the anterior angles and those on the anterior margin much shorter. Wing membrane usually extending beyond the tip of the abdomen. Anterior margin with about 25 spines, anterior vein 23, posterior vein 17.

Abdomen short and thick, about half as wide as long.

General color yellow; thorax and tip of abdomen tinged with orange. Abdomen with light brown transverse bands.

Measurements: Head: length .07 mm., width .14 mm.; prothorax: length .10 mm., width .17 mm.; mesothorax, width .24 mm.; abdomen, width .24 mm.; total length .9 mm. Antennae: 1, 15; 2, 53; 3, 53; 4, 51; 5, 36; 6, 48; 7, 9; 8, 8 microns; total length .267 mm.

Like F. cephalica the anterior portion of the head is markedly depressed with two stout spines on the edge of the depression in front of the ocelli. Anterior ocellus directed forward. These characters, the smaller size, and paler color will distinguish it from F. bispinosa which it resembles in general appearance. Like both F. cephalica and bispinosa the second segment of the antenna is extended upward and forward so that it overhangs the 3rd segment and bears two heavy spines on the dorsal surface near the anterior end.

Described from numerous specimens taken from blossoms of *Bidens* sp., wild morning-glory, *Carissa grandiflora,* citrus, mango, avocado, papaya and beans at Miami March-June, 1919, by Mr. Mason, and a single specimen taken by the author from oak at Gainesville, April 20, 1919.

Type in the author's collection. Paratypes in the National Museum.

KEY TO THE AMERICAN SPECIES OF FRANKLINIELLA
(Euthrips in part)

I. Postocular bristles short or wanting; row of bristles along the anterior margin of the prothorax wanting or at least inconspicuous except often the third from the outer angle.
  a. Antennae uniformly brown to dark brown, concolorous with the body; wings light brown, veins prominent; spines brown, 16-22 on fore vein, 13 to 17 on hind, short and comparatively stout, a white longitudinal area near the base of the wing. *F. minuta* (Moulton) '07.
  aa. Antennal segment 3 yellowish, 4 and 5 light grayish-brown, yellowish at the base; wings gray-brown, veins not prominent, spines on the wings normally long and stout, 14 on fore vein, 10 on hind........*F. fuscus* (Hinds).

II. Postocular bristles conspicuous.
  a. Abdominal sternites with a transversely elliptical pale area. *F. tympanona* Hood ('15).
  aa. Without such pale area.
    b. Second segment of antennae enlarged on dorsal side on the anterior end (asymetrical in side view) and bearing two heavy spines.
      c. Vertex of the head depressed and anterior ocellus directed forward.
        d. Antennal segment 3 a third longer than 2; abdomen slender.
          e. Body yellow, surface not reticulated. *F. cephalica* (Crawford).
          ee. Color uniformly brown; surface of body reticulated. *F. cephalica reticulata* (Crawford).
        dd. Antennal segments 2 and 3 about equal in length; abdomen short; color yellow tinged with orange and brown. *F. cephalica masoni,* n. var.
      cc. Vertex of the head not markedly depressed; thorax orange; ocellus directed nearly vertically. *F. bispinosus* (Morgan) '13.

bb. Second segment of antennae symmetrical, none of its bristles markedly enlarged.

c. Thorax tinged with orange.

d. General color brownish-yellow, not uniform; thorax orange yellow; antennal segment 1 pale yellow; 2 light brown, base sometimes yellowish..*F. tritici* (Fitch).

dd. General color brown to dark brown; thorax orange brown.........*F. tritici moultoni* (Hood).

ddd. Head pale lemon yellow to light yellowish brown; abdomen brownish yellow to brown; antennal segment 1 whitish to light brown, 2 dark brown.

e. Antennal segments 3-5 pale yellow at the base; wings yellowish.
F. tritici occidentalis (Perande).

ee. Antennal segments 3-5 light brown or slightly gray at base; wings brown.

f. Antennal segment 5 shorter than 2, 6-8 gray; prothorax more than 1.5 times as long as wide.
F. stylosa (Hood).

ff. Antennal segment 5 as long as 2, segments 6-8 brownish; prothorax less than 1.5 times as long as wide.........*F. floridensis* (Morgan).

dddd. Color pale yellow; antennal segments 1-5 light yellowish..................................*F. williamsii* Hood.

cc. Color yellow to brownish yellow, shaded with brown; no orange.

d. Costa of wing with 23-30 bristles; fore vein 17-22; hind 13-16.

e. Scale with 6 bristles; head nearly as long as wide; antennal segment 2 dark brown; tenth abdominal segment not split open above.
F. helianthi (Moulton) '11.

ee. Scale with 5 bristles; head ¾ as long as wide; antennal segment 2 yellowish gray; tenth abdominal segment split open above.....*F. gossypii* (Morgan) '13.

dd. Costa of wing with 15-19 bristles; fore vein 13-16; hind 9-10; scale 5.
F. runneri (Morgan). ('13.)

ccc. General color uniformly brown to dark brown, no orange; antennal segments 3-5 light brown to yellow and shaded.

d. Color uniformly dark brown to black; wings brownish gray to dark brown, the basal ¼ to ⅓ clear.

  e. Bristles, especially on prothorax and wings, very long and heavy; prothorax considerably longer than head. Large, 1.6 mm. or more.

    f. Bases only of middle and hind femora and tibiae clear pale yellow.........*F. annulipes* Hood ('15).

    ff. All tarsi and tibiae, and most of fore femora pale lemon yellow. *F. citripes* Hood ('16).

  ee. Bristles long but slender; body length about 1.4 mm.; prothorax about as long as head; all tarsi and tibiae lemon yellow........................*F. auripes* Hood ('15).

  eee. Bristles moderate; middle and hind tibiae and femora deep brown; prothorax longer than head. Length about 1.4 mm.....*F. insularis* (Franklin).

dd. Body color yellowish brown, fore wings uniformly shaded with gray...*F. nervosa* (Uzel).

THE BUTTERFLY'S LULLABY

As we lay stretched out on the forest floor at the edge of the hammock feasting our eyes on colors of the sunset sky, along comes a butterfly hunting a safe nocturnal retreat. After trying several leaves, she finally finds one to her taste and settles down on the under side of it. Can one whose day has been so full of activity suddenly cease all motion and sink into the quiet of sleep? No more easily than can an active child. There must be a transition, a gradual letting down of nervous tension. So the butterfly waves her wings up and down, rather rapidly at first but then slower and slower until all motion ceases. Have we not here the essence of a lullaby, a monotonous repetition which gradually becomes slower and slower; a lullaby of motion rather than of sound; a lullaby given by the tired one herself, because there is none other to give it.

"The morning wind forever blows, the poem of creation is uninterrupted; but few are the ears that hear it."—Thoreau.

"Hold thou, my friend, no lesser life in scorn,
All nature is the womb whence man is born."

The
FLORIDA BUGGIST
Official Organ of The Florida Entomological Society, Gainesville, Florida.

PROF. J. R. WATSON..Editor
PROF. WILMON NEWELL..Associate Editor
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THE CHASE OF CATOCALA

What the trout or the tarpon is to the fisherman, or the tiger-beetles to the coleopterist, the *Catocalas* are to the lepidopterist—the most "game" of all his prey. The hind wings of many species are very showy with wide, curved bands of red or orange. For these the moths are called "Underwings". Their attractive colors and goodly size make a desirable showing in the cabinet. But in the woods, as the moths squat in their favorite day quarters on the bark of some tree, these gaudy colors are safely hidden under the somber grays and browns of the fore pair which are laid back at an angle of 45 degrees so that the moth forms a triangle. The camouflage is perfect and could the moths but sit pat, they could rest in peace as far as humans are concerned. But if one passes within a yard or two of the tree they invariably have an attack of "nerves" and dart away with a quick jerky flight and I can no more resist the impulse to give chase than can a puppy resist the impulse to pursue any rapidly moving thing, be it mouse or railway train. The lepidopterist may know full well that he already has a case full of that particular species and has no more need of another than has the puppy for the train, but the pursuit is the rarest of sports. The primitive instinct of the chase asserts itself and after the moth he goes. But the method of the chase must be that of the cat rather than the dog. We will watch the moth as it darts away to seek another hiding place, trying first one tree trunk and then another until it finds one dark enough to satisfy its negative heliotropism. It will always be in dense shade and usually on the side away from the sun. Towards dusk the moth may fly into the tree tops but very seldom during the middle of the day. Still more seldom does one alight on the level ground but often under the overhanging edge of a perpendicular bank. As it darts away it usually becomes lost among the tree trunks. But by following it carefully with our eyes—and feet too—we can sometimes locate the alighting place. If we are so fortunate the stalking begins. No use to try a frontal attack on these wary fellows; they will invariably fly again long before one gets within striking distance. Having spotted our moth we will make a wide detour, the radius of the circle being in direct proportion to our desire for that particular moth, keeping our eyes constantly on the central tree trunk. The chances are that he will fly again before we can get near him, but sometimes fortune again smiles and we get up to the tree unobserved. By cautiously peeping around the bole we may bring one of his wings into view without being seen ourselves. Having thus located our quarry we make a quick sweep around the tree and capture our prize—sometimes. More usually we catch nothing but a fleeting glimpse of his gay underwings as the now thoroly frightened moth betakes himself to parts unknown. Rarely indeed does he give us another chance at him. Altho the chances are against us at every turn, if we are persistent and the moths plentiful, we may occasionally experience the thrill of seeing one wildly flapping in the net; a freshly landed trout jumping on the bank has no greater. But the moth is game to the last and sorrow and exasperation will surely be our lot if there is a hole in the net. But should fortune frown upon us and we leave the woods with empty bottle, we reek no more than the luckless fisherman who at the close of a perfect day goes home to a supper of collards. Have we not enjoyed a rare game? Are our lungs not full of the ozone of the forest, and our eyes and nerves, tired by a week's work in office or laboratory, again refreshed? It is rare sport, much superior I am convinced to either tennis or golf, and as for sitting idly on a bare bleacher and watching someone else play baseball—one might as well go to a formal reception.

Only in the more dense hammocks may we hope to find the underwings, a forest to whose floor but few rays of sunshine penetrate. And it must be a high and dry hammock where the larva's host plants, oaks and hickories, grow. A low hammock of maples, ashes and sourgums will yield us nothing. Furthermore it must, for a successful hunt, be comparatively free of underbrush. Not that the catocalas object to underbrush but the hunter does. To put all your energy and thought into a grand final sweep with the net only to tear it on a greenbrier while the moth dashes away, is conducive to language which should be reserved for mules, stovepipes, and collar buttons.

The season of the Catocalas is from the last week in April to the middle of June. My earliest capture was of *ultronia celia* on April 11; but Grossbeck (Bul. Am. Mus. Nat. Hist., vol. 27, List of the Lepidoptera of Florida) records *ilia* as having been captured at Lakeland on March 31. He does not record a single capture of any species after May 8. This is due, however, not to the lack of Catocalas after that date, but to the lack of collectors. Most of our entomologists have been migratory animals which left early in the season. Catocalas are at their height of abundance in late May and early June. Only two species have I ever captured after July 7: *ultronia celia* on Oct. 16 and *agrippina* from June 29 to September 13. Evidently the latter does not emerge until late June, which accounts for its having been missed by collectors.

THE CATOCALAS OF FLORIDA AND GAINESVILLE

Grossbeck lists seventeen species and seven varieties from the state. To these I can add two species and a variety as follows:

C. consor, May 25; said to be a rare species.

C. agrippina from Gainesville and its variety *subviridis* collected by Mr. Fritz Fuchs at Wauchula in June. So our Florida species now total 19 with 8 additional varieties. Of these I have captured about Gainesville but nine species and a variety.

Sappho seems to be our most common species, at least more have been captured. This, however, may be partly because its large size (often three inches across the wings) and the light gray color of its upper wings make it more conspicuous than the others. The under wings are dark brown edged with white. Both Holland and Barnes and McDunnough say it is rare. Its life history is entirely unknown. Its relatives spend their caterpillar days on the hickory and it is probable that this one does likewise. It is found only in woods with hickories.

Another with dark brown under wings is *epione.* This is smaller and the upper wings are mottled dark gray and brown. It has been captured only at Gainesville and in late May. It is evidently another late-emerging species which has escaped the tourist entomologists. Its larva lives on oaks and hickories.

Agrippina is the third species with dark brown unbanded under wings. Its colors are much like *epione* but it is a larger insect, some measuring 3.5 in.

Of the species with bright orange bands across the underwings, *ilia* Cramer is the most common. Its upper wings are mottled gray and expand 3.5 in. My captures are from May 12 to 23.

Cara is a trifle larger. It is more brown on the upper wings and the bands on the under wings are red. It is not common here because, of the food plants of its larva, willow is scarce and poplar entirely absent. Ours is the var. *carissimas,* the southern form.

Ultronia has much the same colors but is smaller, about 2.25 in.

Its var. *celia* has the first black band of the under wings narrower and usually a whitish smudge running lengthwise of the fore wing. Its larva feeds on oak, wild cherry, and plum.

In *muliercula* Guer (The Little Wife) the bands are yellowish orange. My captures range from May 26 to June 11, but Grossbeck records it from Lakeland as early as May 5. The food plant of the caterpillar is wax myrtle.

In *similis* var. *aholah* the orange has been replaced by yellow. This is the smallest of our species, measuring but little more than 1.5 in. April 18 is the only date.

The caterpillars of the hickory feeding species often attack pecans but seldom become numerous. The insect is a lover of the deep forest and visits the more open pecan groves only occasionally and at night.

PERSONALS

Clarence Bass, who is now with a subchaser doing patrol duty, recently enjoyed shore leave at Miami and renewed his acquaintance with former associates in the State Plant Board work.

F. F. Bibby is at present with the U. S. Field Hospital and is stationed at Santo Domingo, D. R.

O. K. Courtney is now in the employ of the Federal Horticultural Board and is stationed at New Orleans in connection with the work of inspecting plant importations at that port.

L. A. Daniel, District Inspector for the State Plant Board, is planning to leave for the North early in July to be gone for several months.

J. Chaffin is at present on a trip to the East Coast, where he is assisting various assistant nursery inspectors of the Plant Board in the work in their respective districts.

J. C. Goodwin is spending a couple of weeks in the field inspection work on the East Coast along with the Plant Board inspectors working under the direction of District Inspector A. L. Swanson.

J. E. Graf recently left for Washington, where he will spend some time in conference with the officials of the Bureau of Entomology regarding the eradication of the sweet potato weevil.

A. S. Hooker has recently been transferred from scout inspection work in Lake County, Fla., to duty at Sebring, Fla.

W. N. Hull has recently returned from a few weeks' sojourn at Hot Springs, Ark. He plans to shortly move from Miami to a point on the Florida Keys where important developments in connection with the lime industry are under way.

Arthur C. Brown is at present in charge of the port and quarantine inspection work at Miami for the Federal Horticultural Board and State Plant Board of Florida.

Walter O. Lahrman, formerly assistant nursery inspector for the State Plant Board, is now in the garage business at Daytona.

L. Russell Warner is in charge of the plant quarantine inspection work at Key West, assisted by Messrs. Emil L. Gehry and Harold Mowry.

Thomas R. Robinson, who returned a few weeks ago from military service, is now stationed at Largo, Fla., in connection with the canker eradication work of the Bureau of Plant Industry and State Plant Board.

L. O. Smith is now an inspector in the employ of the Federal Horticultural Board and is stationed at El Paso, Texas.

"Doc" (C. E.) Wilson and Mrs. Wilson (formerly Miss Mildred Nothnagel) are now located in their new home at the Experiment Station at St. Croix, Virgin Islands.

Miss Evelyn Osborn leaves for her home in Ohio early in July. The small appropriation given to the Experiment Station by the Legislature has rendered it necessary to dispense with all assistants.

Dr. H. S. Davis, secretary of the Society, has left on his summer vacation. He will spend most of it at the laboratory of the U. S. Bureau of Fisheries at Fairport, Ia., studying the diseases of fishes.

REPORTS OF MEETINGS

April 28. The Society was called to order by the president with the following members present: E. W. Berger, E. K. Bynum, H. S. Davis, P. W. Fattig, K. S. Lamb, G. B. Merrill, Wilmon Newell, F. M. O'Byrne, Frank Stirling, O. T. Stone, J. R. Watson, A. C. Brown. Visitors: F. N. Cellon, Miss Evelyn Osborn.

Under "Timely Notes" Mr. Stirling exhibited specimens of the large luminous elater of the West Indies, *Pyrophorus noctilucus*, taken from the mails by the quarantine department at Key West. The large luminous areas on the sides of the prothorax gave off a light sufficient for reading a newspaper. Mr. Stirling exhibited a drone trap filled with drones captured at the entrance to one of his hives.

Mr. Stirling read a paper on "Birds as Plant Preservers", pointing out the great value of birds in keeping down insect pests and in destroying the seeds of weeds.

Prof. Watson gave a brief talk on The Cuban Citrus Thrips, *Frankliniella insularis.*

May 26. The meeting was called to order by Pres. O'Byrne. The following new members were elected: Miss Evelyn Osborn, assistant entomologist in the Experiment Station, and G. F. Mosnette, in charge of the Laboratory for the Study of Insects of Sub-tropical Fruits Other than Citrus, U. S. Bur. Ent., Miami.

P. W. Fattig gave the paper of the evening on "Grasshoppers", drawing largely from his experience while connected with the anti-grasshopper campaign in North Dakota. He stated that he had collected 47 species in the Gainesville region.

Under "Timely Notes" Dr. Berger exhibited specimens of an unidentified beetle boring in citrus. He stated that it is the first time he has had any experience with borers injuring citrus but has understood that there was considerable injury after the great freeze. Prof. Watson, as the member of the committee for Florida, Georgia and the Carolinas, announced that the Ecological Society of America desired information concerning tracts of land which should be preserved in their natural condition for the study of their peculiar fauna and flora. He also announced considerable damage to peanuts by thrips at Oldsmar. E. K. Bynum reported having found a severe infestation at Moore Haven.

The Secretary called attention to a monograph on the American species of the genus Catocala (Moths) by Barnes and McDunnough which had been presented to the Society by the American Museum of Natural History.

H. S. DAVIS, Sec'y.

June 23. Meeting called to order by Pres. O'Byrne. Visitors present were Dr. C. F. Hodge, instructor in nature study in the summer school; Mr. W. L. Goethe, principal of the Eustis schools; Miss Ora Hiatt and Mr. J. C. Holton, both of Gainesville, Fla.

The paper of the evening on "Spiders" was read by Miss Evelyn Osborn. This was illustrated by specimens of some of the more common species of spiders of the Gainesville region.

Under "Timely Notes" Dr. Hodge mentioned the success which his fly trap is meeting.

J. R. W.

STRATEGUS WANTED—Am making a special study of this genus, of the Scarabeidae, and should be very glad to receive Florida specimens, especially of the rarer species. Will exchange or pay cash. Address W. Knaus, McPherson, Kansas.

The Florida Buggist

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*MOSQUITOES FOUND ABOUT GAINESVILLE, FLA.

By U. C. LOFTIN

PART I. SPECIES, BREEDING PLACES, MOSQUITOES AND DISEASE, NATURAL ENEMIES, PREVENTIVES

Mosquitoes have been known to man since time immemorial, but so far as we know, there has been only one man who was thankful for their existence. In the Old Testament we find that when King Saul was seeking David to slay him, he was asleep in a cave one night when David entered and secured his spear and a bit of his robe. In the Talmud version of this story, we are told that King Saul was guarded by Abner who had stretched himself across the entrance of the cave so that David had to crawl over him to enter. As David was leaving, Abner turned and threw his leg over David's ankle. If David moved, Abner would awaken and kill him; if he waited, day would come and death would follow. The Lord seeing David's predicament, sent a mosquito to bite Abner and cause him to move his foot, thus freeing David who went away thankful and praising God for sending the mosquito. Since that time, man has considered them a nuisance—not only this, but the more recent discoveries have shown them to be transmitters of disease and one of the greatest menaces to public health with which we have to contend.

Mosquitoes are found everywhere, from the frozen arctic regions to the depths of the tropical jungle. When Linnaeus, in 1758, published his catalogue of all the animals then known to exist, he recorded only six species of mosquitoes. Theobald

*Thesis presented at the Univ. of Fla., in 1913, for the degree of Master of Science.

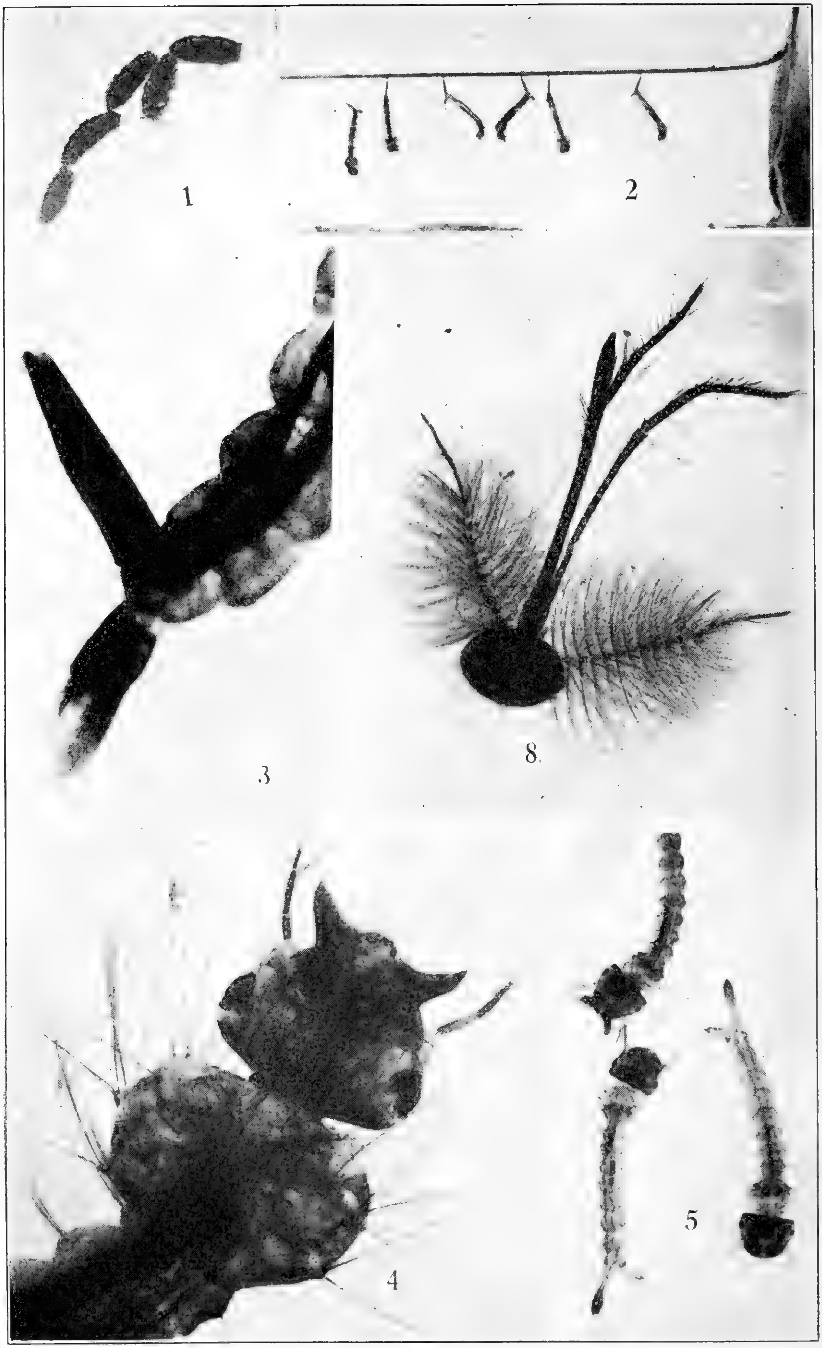

PLATE I. *Culex quinquefasciatus.* (1) Egg rafts (enlarged). (2) Larvae (Wigglers) showing long anal or respiratory tube and oblique angle of suspension from surface of water. (3) Respiratory tube of larvae (greatly enlarged). (4) Head end of Larva (enlarged). (5) Larvae (enlarged). (8) Head of adult male showing plumose antennae and long palpi.

Original numbering of figures has been retained but Figs. 6, 7, 11, 14 and 15 have been omitted

(1901), in his Monograph of the Culicidae of the World, listed about six hundred species, over sixty of which are recorded from the United States.

Naturally the first question that arises is, "Where do all these pests come from?" "Where do they breed?" It is now known that, with a few possible exceptions that do not occur here, all mosquitoes are aquatic in their younger stages. They live under the surface of the water but are true air-breathers without gills and must come to the surface for air. The air is taken in through the trachael tube which ends in the prolongation of the eighth abdominal segment, called the anal or respiratory tube. This tube is pushed through the surface film and a supply of air drawn in. Later, in the pupal stage, they breathe through two trumpet like tubes arising from the top of the thorax. The food of these larvae consists of bacteria, slimes, and decaying animal and vegetable matter, while a few are carnivorous. Different species breed in different kinds of water. Some will breed only in salt water, others in clean fresh water, while still others prefer polluted sewerage. In studying the mosquito question for extermination, it is important to know where and what kind of breeding places we have to contend with.

The following species have been taken, but there may be others that occur rarely:

Culex quinquefasciatus Say.
Anopheles crucians Wied.
Anopheles quadrimaculatus Say.
Stegomyia calopus Meig.
Psorophora ciliata Fab.
Psorophora floridense D. & K.
Megarhinus sp.?

Following is a brief description of these species:

CULEX QUINQUEFASCIATUS

Eggs.—This is the commonest species. The eggs are somewhat conical in shape and are laid on the surface of the water with the large end down. They are placed side by side and stuck together, forming a boat shaped raft (Fig. 1) of six to thirteen rows with forty eggs in a row, each raft containing from one hundred to four hundred eggs, with an average of one hundred and seventy-eight and four-tenths (Davis 1906). They are white when freshly laid, but soon turn grayish brown to black as seen from above, and silvery grayish below, due to a film of air which protects the eggs from the water. They usually hatch in from sixteen to twenty-four hours but they have remained unhatched in the laboratory for ten to twelve days. A few hours desiccation kills them. (Mitchell 1907.)

The eggs are usually laid at night or early morning, but I have observed

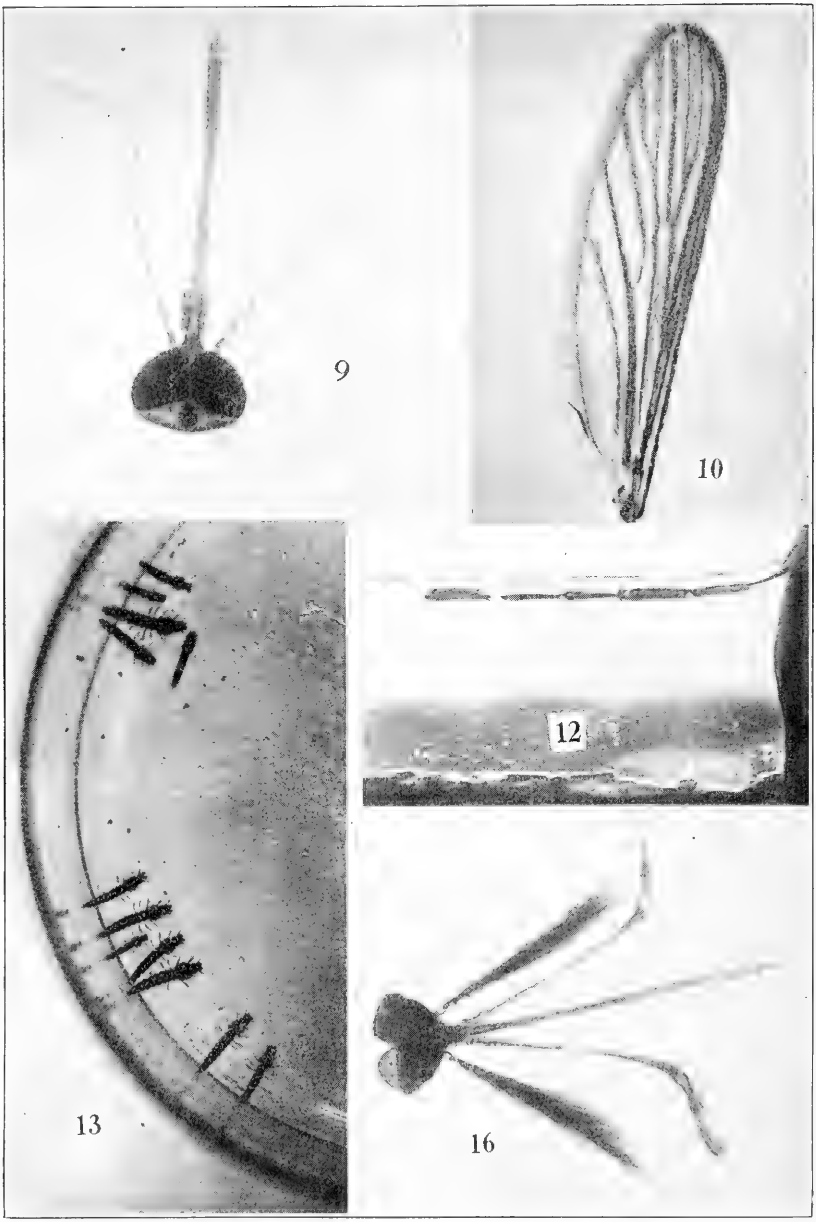

PLATE II. (9) Head of adult female *Culex quinquefasciatus* showing pilose antennae and short palpi (enlarged). (10) Wing of *Culex quinquefasciatus*. (12) Larvae of Anopheles resting at the surface of water. (13) Larvae of Anopheles seen from above. (16) Head of adult male Anopheles (enlarged).

a female finishing a raft as late as 9:30 a. m. on a bright day. Males and females bred from larvae in the laboratory, have been confined in a breeding cage for four weeks with a diet of fresh and dried fruit, but never have any eggs been deposited unless they were fed a meal of blood. Smith (1908) states that blood is the preferred food but is not a necessity and he has had females ovipost on a diet of foul water.

Larvae.—The larvae issue from the under side of the eggs. They have a long anal tube and float below the surface at an oblique angle (Fig. 2). The anal tube is about five times as long as wide, tapering rapidly toward the last half and bears four tufts (Fig. 3). The antenal tufts are set in a notch on the apical half, and are never over half the length of the antennae (Fig. 4).

The larvae (Fig. 5) vary in color from light, almost colorless, to greenish, and nearly black, depending upon the food. Larvae that have had scant food supply and developed slowly seem to be lighter colored than those that developed quickly. The larval stage lasts from seven days (Howard 1902) to several months. Smith (1908) has found the time in New Jersey to vary from one to three weeks depending upon the temperature and the food supply. The time required here was about two weeks in September and October, but was probably longer during the winter. In one instance, in May, they required only seven days to pupate while they have been kept in the laboratory from October twenty-first to February third and then died before pupating. The usual time required in the laboratory was four or five weeks.

The food consists of minute algae, bacteria, and decaying vegetable material. They browse over the vegetable material and eat the bacteria, slime, etc., that accumulates there, as well as some cellular tissue, but no animal tissue has been found in the stomachs examined (Johnson 1902). They have frequently been observed nibbling over the bodies of the larvae that had died, and in one instance the larvae of *Citheronia regalis**, but they may have been eating only the bacteria.

Pupae.—The pupae are easily distinguished from the larvae by their enlarged head and thorax. The trumpet like breathing tubes which are over six times as long as wide (Mitchell 1907), arise from the dorsum of the thorax. The pupal stage lasts from two to several days.

Adults.—The adults are small to medium sized individuals, usually light brown in color, though varying from light green to almost black. The abdominal segments are banded basally with white, usually conspicuous, but sometimes indistinct. They rest upon the wall in a horizontal position, with the head upward, and the body held parallel to the wall.

The scutellum is three lobed with the posterior end of the thorax bare. The palpi in the males are as long as the proboscis, but in the females less than one-half as long. The antennae of the males (Fig. 8) are thickly covered with hairs, but in the females, sparsely covered (Fig. 9). The front claws of the males are toothed, but single in the females with the tarsi uniformly blackish. The veins of the wings (Fig. 10) are uniformly covered with narrow scales. The petiole of the first submarginal cell is about one-fourth the length of the cell. They do not fly far, but several hundred yards may be covered when seeking for food or breeding place. (Smith 1908.)

The length of life of the adult is very variable. In the north the im-

*The Regal Moth.

pregnated females hibernate over winter and then may live several weeks and lay two or three times. They have lived for five weeks in confinement in breeding cages (during April and May) on a ration of dried fruits.

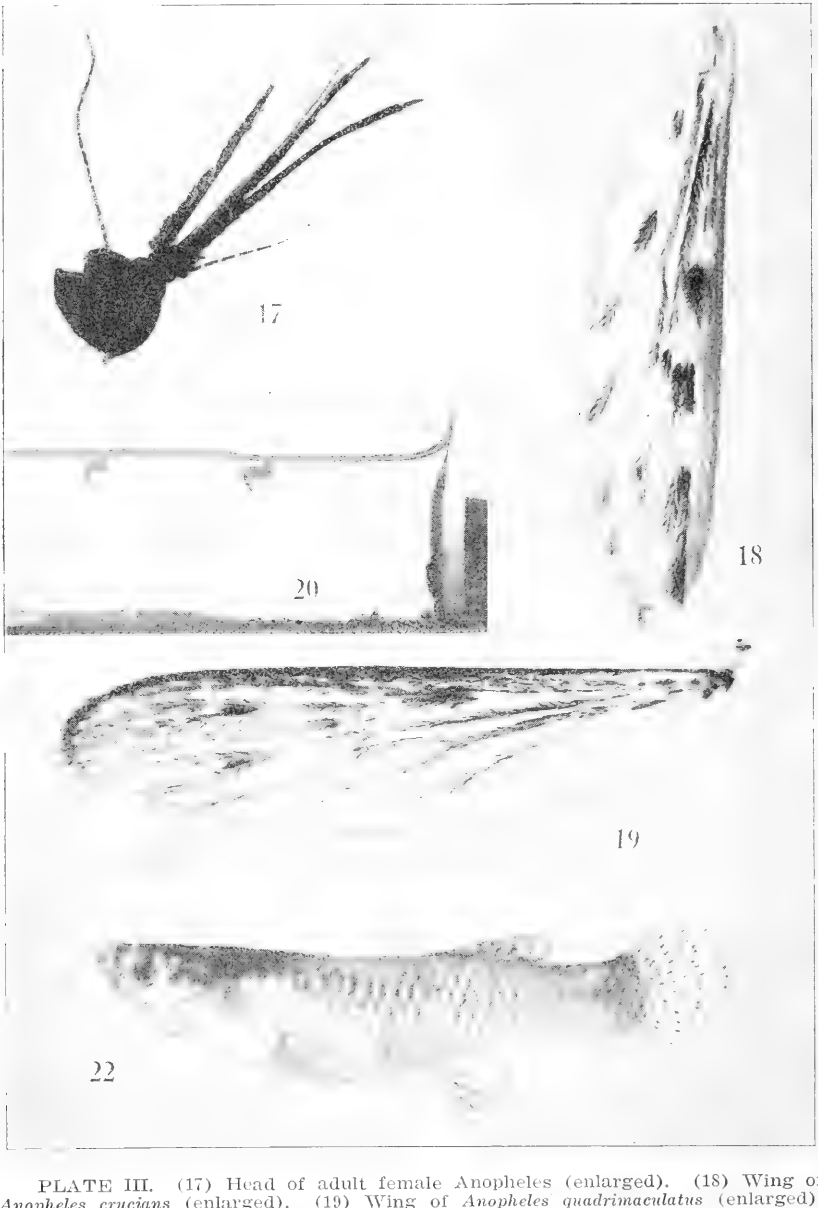

PLATE III. (17) Head of adult female Anopheles (enlarged). (18) Wing of *Anopheles crucians* (enlarged). (19) Wing of *Anopheles quadrimaculatus* (enlarged). (20) Pupae of *Stegomyia calopus* suspended at surface of water by the breathing tubes on thorax. (22) Top Minnow *(Gambusia affinis)*.

BREEDING PLACES

Larvae have been taken in holes, puddles, wells, buckets, barrels, stump holes, basements of buildings, wagon ruts, marshes, ditches, cess-pools, and dishes inside or outside of buildings.

ANOPHELES

Eggs.—The eggs are boat shaped, one side being flatter than the other, and are covered with a fine reticulated membrane. They are not stuck together in rafts, but float singly or in groups upon the surface of the water. They usually hatch in thirty-six to forty-eight hours, but they may remain viable for several months (Mitchell 1907). They have remained unhatched for fifteen days in the laboratory.

Larvae.—The larvae are easily distinguished by their resting position in the water (Fig. 12). They have a very short anal tube and the body is always held parallel to and touching the surface, and are supported by the anal tube and the racemose hairs (Fig. 13) along the sides of the body indenting the surface film. (Berkley 1902.)

The color varies from very light green to dark brown, almost black. There are often whitish markings on the thorax and abdomen, but these are very variable and often entirely lacking. The length of the larval stage under favorable conditions, may be as short as six days (Howard 1902), but is often much longer. *Anopheles quadrimaculatus* has remained in this stage for two months in the laboratory.

The larvae feed at the surface and will swallow any minute floating particle.

Pupae.—The pupae resemble Culex very much, but they have shorter and broader respiratory tubes which are placed near the middle of the thorax. The length of the pupal stage is longer than for Culex, varying from five to ten days (Howard 1902).

The eggs, larvae, and pupae of the two species we have are very much alike, and are not easily distinguished.

Adults.—The adults of this genus are easily recognized by the position in which the body is held when at rest. It is held at an angle to the surface, which gives them the appearance of standing on their heads. The body of *A. crucians* is usually held at an angle of sixty to seventy degrees, while *A. Quadrimaculatus* usually forms an angle of forty-five to fifty degrees. When there is a breeze blowing, they have been observed clinging to the window screens in the position assumed by Culex, and once or twice when the wind was blowing hard, the body was pressed against the screen. When resting, the hind feet usually point backward and are held a little below the level of the body.

The scutellum is convex behind and the proboscis is straight. The palpi are as long as the proboscis (Figs. 16 and 17) and the claws simple in both sexes. The wings are spotted with white and black scales, but the front margin is wholly black scaled.

Anopheles crucians can be distinguished from *Anopheles quadrimaculatus* by the spots on the wings. In *A. crucians* (Fig. 18) the last vein is white scaled and marked with three black spots; while in *A. quadrimaculatus* (Fig. 19) the last vein is wholly black scaled.

(Continued on page 28)

The
FLORIDA BUGGIST

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PROF. WILMON NEWELL .... Associate Editor
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AN UNDESCRIBED TELEONEMIA FROM FLORIDA AND JAMAICA (HEMIP.)*

By CARL J. DRAKE

Since the publication of "The North American Species of Teleonemia Occurring North of Mexico" (Ohio Journal of Science, Vol. XVIII, pp. 323-332, 1918) the writer has received through the kindness of several workers many specimens of *Teleonemia* from North America and the West Indies. The new species described herein is the same form as listed by Van Duzee in "Notes on Jamaican Hemiptera" (Bulletin of the Buffalo Society of Natural Science, Vol. VIII, pp. 3-77, 1908) under the name *Teleonemia scrupulosa* Stal. The insect is named in the honor of Prof. E. P. Van Duzee.

Teleonemia vanduzeei new species.

Antennae moderately long, slender, sparsely pilose; first segment a little stouter than and subequal in length to the second; third segment moderately long, slender, about three times as long as the fourth; fourth segment subequal in length to the first and second conjoined. Head armed with five moderately long, porrect spines, the spines arranged as in related species. Length, 3.15 mm.; width, 1.2 mm.

Pale testaceous or light brownish testaceous, with dark brown markings. Pronotum brown, slightly tinged with ferrugineous, tricarinate, lateral carinae slightly diverging posteriorly; paranota distinctly uniserate, not quite reflected back against the pronotum proper; carinae rather thin, all strongly raised and with a single row of rather large areolae, the median carinae raised anteriorly and projecting subangularly over the base of head. Elytra constricted a little beyond the middle, with dark brown to nearly black markings in discoidal and sutural areas; costal and subcostal areas uniseriate, the areolae rather large; sutural area with the color marking tending to form a transverse band a little before the apex; discoidal area bounded

*Contributions from the Department of Entomology, The New York State College of Forestry, Syracuse, N. Y.

by strongly raised nervures, faintly pubescent, mostly dark brown to nearly black in color. Antennae brown, the apical segment somewhat darkened. Body beneath brown, usually tinged with ferrugineous. Legs brown, the tips of femora and bases of tibiae, and the tarsi dark. Rostrum extending slightly beyond the meso-metasternal suture. Rostral sulcus open behind.

Akin to *T. scrupolosa* Stal, but readily separated from it by the longer and much less pilose antennae; the pubescence in the discoidal area is almost entirely wanting. Twelve specimens. Florida: Crescent City, September 7, 1898, Otto Heidemann Collector. Jamaica: Mandeville, Kingston, January to April, 1908, E. P. Van Duzee Collector. *Type* in my collection; *paratypes* in the collections of E. P. Van Duzee, Cornell University (late Heidemann Collection) and of the writer.

THE NATIVE HOST-PLANT OF THE CAMPHOR THRIPS.

(*Cryptothrips floridensis* Watson.)*

The camphor thrips was first collected by Mr. W. O. Richtman, on the camphor farm at Satsuma in November, 1912 (see An. Rep. Fla. Ag. Exp. Sta. 1913, p. lxvii). Subsequent search thruout Florida revealed its presence in many places, but by no means in all those investigated. This discontinuous distribution and our failure to find the insect on any plant except camphor, which is an introduced plant, finally led us to the opinion that it is an introduced pest, perhaps brought to us on camphor. This opinion was strengthened by the receipt of a single poor specimen of an adult and several larvae of apparently this species collected on camphor in Ceylon (An. Rep. Fla. Ag. Exp. Sta. 1915, p. lxxi).

The first evidence that pointed to an opposite conclusion was gathered on a visit to the DuPont Camphor Farm at Waller last July. The insect was not noticed in this plantation until spring of this year and one of the first centers of infestation was near a "bayhead" in an out-of-the-way section of the farm. This pointed to the bayhead as a possible source of the insect. Accordingly the native vegetation in the bayhead was subjected to a vigorous sweeping and a single adult of the camphor thrips was captured. Altho this pointed strongly to the bayhead as the home of the insect, there was a possibility that the thrips caught there had strayed into the bayhead from neighboring

*Paper read before the Florida Entomological Society Sept. 29, 1919.

camphor. If the insect was native to the bayhead what was its foodplant there? Those of you who are familiar with our bay-heads know that the vegetation there is a bewildering mixture of a large number of species of shrubs, herbs and grasses with no apparent order or zonation. It was therefore difficult indeed to determine the exact host plant. Because it belongs to the same family as camphor we naturally suspected the bay itself. There are two entirely unrelated genera of plants that are commonly called "bays" in Florida. One is a certain small species of *Magnolia* of the magnolia family and the other is *Persea,* or *Tamala,* of the laurel family, the family to which camphor belongs. It was, of course, the latter only that was suspected of possibly being the host plant of the camphor thrips. However, a thorough beating of this plant at Waller failed to reveal the presence of the thrips. A fortnight's vacation spent at Daytona Beach afforded an opportunity to study the bay there, *Tamala littoralis* being one of the most abundant trees on the island. The very first tree investigated yielded many of the camphor thrips, both adults and larvae. Further investigation showed that the thrips was generally distributed thruout the island. It was found on trees miles from any camphor and in isolated places to which the opportunities of catching a ride must be few. On only a few trees, however, was the infestation heavy. It has since been found on the same species of bay at Orlando.

Following the discovery of this thrips on bays and its identification on structural grounds as *Cryptothrips floridensis,* live thrips were taken to the laboratory and transferred to camphor. Vice versa thrips collected from camphor were transferred to bay. In both cases the insects fed with avidity on the new host. They seemed to have no choice whatever as between camphor and bay, provided the leaves or twigs were of an equal age. We have not as yet had an opportunity to study their behavior in the field where bays and comphor are growing side by side.

There can then, it would seem, be no doubt but that the native bays of the genus Tamala are the native hosts of the camphor thrips which is a native insect that has spread to the camphor wherever opportunity offered. Its uneven distribution over the state and its absence from many camphor hedges and trees is to be explained by the remoteness of the uninfested trees from bays and lack of transportation facilities.

These developments lead to a reexamination of the specimen from Ceylon, for if the insect is a native of Florida, feeding on the wild bays, it would seem unlikely that identically the same species should be found in Ceylon. Altho the Ceylon specimen is undoubtedly a *Cryptothrips* and remarkably similar in size and color to *C. floridensis*, a close examination reveals differences in the shape of the thorax and the antennal segments. The Ceylon specimen is probably a distinct but closely related species.

The injury inflicted on bay is similar to that on camphor but less severe. There is the same destruction of the new terminal growth but fewer and less severe bark lesions. The larvae seem to feed more on the leaves and less on the bark than when attacking camphor. Following the destruction of the terminal bud the lateral buds develop freely, resulting in a sort of witch's broom or "multiple bud" growth. The withered terminal shoots cling to the tree longer than do those of camphor and form retreats in which the thrips commonly hide. These dead twigs are the most likely places in which to search for the insects.

Thus far the larvae have been found on only the shore bay, *Tamala littoralis,* but trees of *Tamala barbonia* about Gainesville show typical thrip injury. The avocado belongs to the genus *Persea* to which genus the bays have been commonly referred. Upon the discovery that the latter were the native hosts of the thrips, some apprehension was felt lest the insects might be able to feed also on avocadoes and ultimately perhaps to invade the avocado orchards of the state. In the laboratory, however, they have refused to feed on young growth of the Mexican avocado.

The life history of the camphor thrips has not been worked out in detail. A single generation was raised in May 1913. The eggs hatched in eight or nine days and the larvae had become adults by the 24th day.

Contrary to our previous experience we have lately observed the insect to fly. The flight was, however, very short. That it does not commonly fly far is indicated by the fact that camphor trees less than a half mile from a center of infestation have remained free for years. A hedge near the writer's home at Gainesville is still uninfested, altho a colony of thrips has for six years existed within a half mile and for the past year within 900 feet. This hedge borders an unused alley where opportunities for transportation are few. Trees along the neighboring street where traffic is heavy have become infested.

J. R. WATSON (Ag. Exp. Sta.).

MOSQUITOES FOUND ABOUT GAINESVILLE, FLA.

(Continued from page 23)

The length of life of the adult is variable. They must live for at least a week after biting before they can transmit malaria. In the north, they hibernate as adults in cellars, barns, etc. (Howard 1911). They fly only short distances. In the work at Panama, three hundred yards from the breeding points has proved to be safe.

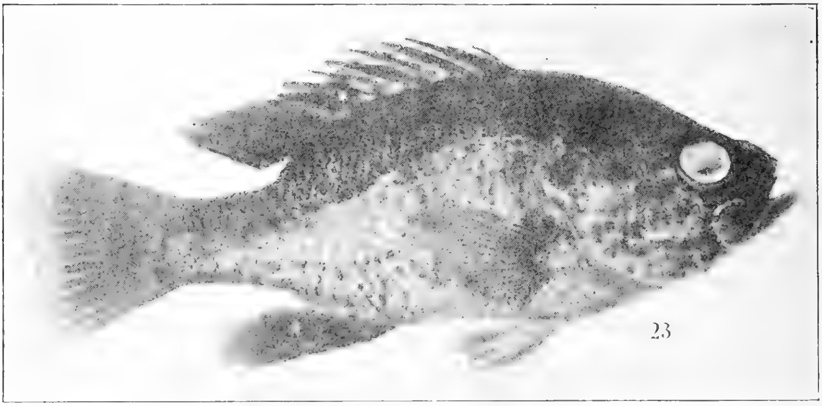

PLATE IV. (23) Warmouth Bass *(Chaenobryttus gulosus)*.

Anopheles usually bite only at night and this point has been emphasized in protection from malaria, but both *A. crucians* and *A. quadrimaculatus* have bitten in the late morning in the Experiment Station toilet.

BREEDING PLACES

Larvae have been taken in the edge of marshes, in road ditches, basements, pools, and several other places that were a mile or more from the University. They have been several times taken with Culex larvae.

STEGOMYIA

Eggs.—The eggs are laid singly as with Anopheles. They are black in color, conically elongated, and are covered with a reticulated membrane which collects air and gives them buoyancy (Berkley 1902, Art. by Dr. Agromonte). They usually hatch in from fifteen hours to three days, but will stand desiccation for a day or two and remain viable for at least a month (loc. cit.).

Larvae.—The larvae closely resemble those of Culex, but are larger, less active, and remain below the surface much longer. The anal tube is somewhat shorter and thicker than Culex, being about three times as long as wide, and tapers regularly. The anal tube bears but one pair of tufts and has the teeth of the pecten evenly spaced. The antennae do not taper apically and the tuft is placed at or before the middle. The length of the larval stage varies from eight to twenty days.

Pupae.—The pupae (Fig. 20) resemble Culex, but are larger. They remain as pupae two or three days.

Adults.—The adults are easily recognized. They have the legs and abdomen conspicuously banded with white and the dorsum of the thorax bears a lyre-shaped area of white, though this is sometimes inconspicuous. They fly and bite only during the day.

BREEDING PLACES

The larvae of this species have been found in an old pot, tin cans, and in pans in the laboratory.

PSOROPHORA

The eggs are large, spined, and laid singly. The larvae are much like Culex, but can soon be distinguished by their large size, being over one-half of an inch when full grown. They are cannibalistic and feed upon larvae of Culex, Anopheles, and the smaller ones of their own species. (Berkley 1902.) The adult of *P. ciliata* is easily recognized by its large size and the bands of erect scales on the legs. *P. Floridense* looks very much like Stegomyia, but so far as I have observed, they fly and bite only at night. Neither species are ordinarily troublesome here. No local breeding places have been found.

(To be continued in Nos. 3 and 4. No. 3 will contain Mosquitoes and Disease, Natural Enemies, and Preventives; No. 4, Part II, Traps for Mosquitoes.)

PERSONALS

Announcements of the marriage of Mr. A. C. Mason of the U. S. Ent. Laboratory at Miami to Miss Mary McConchie, at Paris, Ill., have been received.

Mr. C. A. Bennett has established his laboratory for the camphor thrips work at Satsuma. With J. R. Watson of the Fla. Exp. Station, who has been made colaborator in the Bureau on this project, he has recently made a trip to Macclenny, Glen St. Mary, and Monticello.

Mr. K. E. Bragdon is at present supervising the inauguration of a general survey of the peninsular section of Florida for the purpose of finding whether or not the sweet potato weevil has become established at interior points.

Mr. W. R. Briggs has recently been appointed County Agent for Manatee County, with headquarters at Bradentown.

Mr. A. C. Brown recently participated in the boll weevil investigations conducted by the State Plant Board in the northern part of the state.

Mr. Clarence A. Bass, until recently in the navy, is at present in Baltimore, recuperating from an operation. Upon his recovery he is expected to resume his position with the State Plant Board.

Mr. Milledge M. Bass recently resigned from the position of District Inspector for the State Plant Board to accept a position as manager of a large citrus property belonging to the Standard Growers' Exchange, located near Fort Myers.

Mr. Eli K. Bynum has been granted a leave of absence of several weeks by the State Plant Board, in order to attend to personal business affairs at his home at Satillo, Miss.

Mr. Virgil Clark is now in western Florida making re-inspections of citrus properties formerly infected with citrus canker, this work being done jointly by the State Plant Board and the Bureau of Plant Industry, U. S. D. A.

Mr. Howard G. Carter recently resigned as District Inspector for the State Plant Board. He will henceforth devote his time and attention to his fruit-growing properties in southern Dade County.

Mr. E. F. DeBusk, County Agent of Orange County, has announced his forthcoming resignation. It is understood that he will engage in commercial work.

Mr. B. F. Floyd, Plant Physiologist of the University of Florida Experiment Station, has resigned for the purpose of entering commercial life. He will have charge of the insecticide work of the Wilson-Toomer Company.

Mr. Wm. Gomme is now County Agent of Polk County.

Mr. Chas. M. Hunt, Assistant Nursery Inspector for the State Plant Board, is now located in the Nursery Inspector's office at Gainesville.

Mr. Neal E. Hainlin is now engaged in the citrus canker re-survey work and is located in the northeastern portion of the state.

Mr. K. S. Lamb, formerly Asst. Quarantine Inspector with the State Plant Board, is now occupying a position as traveling salesman for the Loose-Wiles Biscuit Co.

Mr. Harold Mowry, Asst. Quarantine Inspector for the State Plant Board, is now located at Key West.

Mrs. N. M. G. Prange, of Jacksonville, was one of the enthusiastic attendants at the recent Citrus Seminar at Gainesville.

Mr. Wilmon Newell, Plant Commissioner, attended conferences, regarding the European corn borer, at Albany, N. Y., and Boston, Mass., on August 28th and 29th. He afterwards visited Riverton, N. J., and made a personal investigation of the Japanese beetle infestation at that point.

Prof. S. I. Kuwana, Government Entomologist of Japan, recently visited Florida. At Orlando he visited the Bureau of Entomology Laboratory in charge of Mr. W. W. Yothers, at Tampa he investigated the quarantine work of the State Plant Board, and at Largo the citrus canker eradication work, after which he spent two days at the University of Florida Experiment Station and the State Plant Board offices at Gainesville.

Mr. L. Russell Warner, Asst. Quarantine Inspector for the State Plant Board, is ill with typhoid fever at Key West. Fortunately his condition is not considered as critical and hopes are entertained for his steady recovery.

Mr. Frank Stirling installed and had charge of an exhibit for the State Plant Board at the West Florida Fair, at Marianna, October 28th to November 1st.

Mr. D. N. Reynolds is at present assisting the farmers of western Florida and particularly those of Jackson and Liberty Counties in dealing with the mosaic disease of sugar cane.

Mr. A. L. Swanson is heading a small party of inspectors assigned by the Plant Commissioner to the task of determining to what extent the mosaic cane disease may have become established around Lake Okeechobee.

Dr. C. F. Hodge has accepted an appointment with the new Extension Division of the University and is a most welcome addition to our meetings.

A NEW PHYSOTHRIPS FROM OREGON

J. R. WATSON

A small collection of thrips collected by Prof. A. Burr Black and sent to the writer contains specimens of an apparently undescribed species.

Physothrips blacki, n. sp.

♀. General color brown, a slight tinge of orange on the thorax of some specimens.

Measurements: Total length 1 mm. Head length .09 mm., breadth 0.15 mm.; prothorax: length 0.13 mm., breadth (including coxae) 0.17 mm.; mesothorax: breadth 0.24 mm.; metathorax: breadth 0.21 mm.; abdomen: breadth 0.26 mm. Total length on antennae 0.22 mm. Segment 1, 25; 2, 33; 3, 37; 4, 36.5; 5, 32.5; 6, 42; 7, 7; 8, 14 microns.

Head considerably wider than long; cheeks slightly convex, sparsely hairy; vertex with several very distinct cross striations; no large postocular bristles, but a row of 8 small bristles extends across the vertex behind the eyes; a long spine in front of each posterior ocellus. *Eyes* large bright red by reflected light, occupying over half the length of the head and two-thirds the breadth, sparsely pilose, facets large. *Ocelli* very large, posterior margins of the posterior pair even with and near the posterior margins of the eyes, bordered on the inner sides by heavy pigmented crescents. Anterior cellus directed partly forward, bordered posteriorly by a large pigmented area. *Mouth-bone* long and pointed, reaching nearly or quite across the prosternum. *Antennae* 8-segmented, 1 and 2 almost as dark as the head, 2 often darker than 1; 3 and the base of 4 light-brownish yellow, remainder light brown. Spines and sense cones short and colorless but some of the latter heavy.

Prothorax squarish, sides slightly convex and diverging posteriorly. Posterior angles rounded and provided with a pair of heavy bristles. The anterior angles bear only very short bristles. *Mesothorax* with very convex sides, no large bristles. *Metathorax* with sides nearly straight and parallel. *Legs* rather long, except for the lighter tarsi, nearly concolorous with the body. Fore legs often lighter than the others. Fore *wings* light brown; veins bearing prominent bristles; 11 or 12 on the fore vein, 8 or 9 near the base, 2 in the center and one near the apex; 11 or 12 on the posterior vein, none on the base; fringing hairs stout but rather short and sparse. Hind wings colorless.

Abdomen elliptical, tapering acutely to the base. Spines short on the anterior segments and those on the posterior less than ⅔ the greatest width of the abdomen.

♂ Smaller than the female. Some specimens are considerably lighter in color, especially the antennae and legs. The latter are sometimes yellow.

Abdomen widest at the base; well rounded posteriorly. The last segment bears several pairs of strong but short bristles.

Measurements: Total body length .87 mm.; head: length .086, breadth .134 mm.; prothorax: length .107 mm., breadth .155 mm.; mesothorax .202 mm.; abdomen: width at base .156 mm.; antennae: total length .187; segment 1, 18; 2, 30; 3, 34; 4, 34; 5, 28; 6, 39; 7, 6; 8, 12.5 microns.

Described from six females and 12 males collected from California poppy and dandelion at Corvallis, Oreg.

REPORTS OF MEETINGS

Aug. 4 (Adjourned meeting). Meeting was called to order by Vice President Merrill at 5 p. m. with the following members present: Geo. B. Merrill, P. W. Fattig, J. R. Watson, Dr. J. H. Montgomery, J. C. Goodwin, C. M. Hunt, Frank Stirling, O. T. Stone, P. H. Rolfs, and E. W. Berger. Visitors present were Prof. W. L. Floyd, Dr. C. L. Crow, W. L. Goette, Dr. C. F. Hodge and several students of the summer school. The following new members were elected: Miss M. F. Hill, teacher, Trenton; W. J. Schubert, of Armour and Co., Jacksonville; E. F. DeBusk, County Agent, Orlando; Dr. C. F. Hodge, instructor in summer school; and W. L. Goette, teacher, Eustis.

The address of the evening by Dr. Hodge on "Housefly Control" was listened to attentively. Dr. Hodge exhibited and explained his fly trap and gave much valuable data on the habits of flies. Flies will usually not travel much over 500 yards if food is available within that area. They may travel even a mile in search of food, and even further over water. The waterworks of Cleveland, Ohio, situated 1¼, 5, and 6 miles from shore were one summer overrun with flies. On the furthest crib the biting stable fly was most abundant and troublesome. On the nearer cribs some blue-bottles were present.

One trap is sufficient for a radius of 100 yards provided all other food is kept out of reach of the flies. One afternoon is sufficient to capture all the flies in such an area.

Dr. Hodge also explained how he got the idea that it was possible to "trap a vacuum" of flies. He had been paying boys to collect flies for feeding young quail. One day while dining with a friend on an open porch of his residence the absence of flies was commented upon and it occurred to him that the boys had caught all the flies. The trap was the outcome of this observation and finally led to his successful attempts at cleaning up the flies in whole cities.

E. W. BERGER, Acting Sec'y.

Sept. 29. Meeting called to order by Pres. O'Byrne at 5 p. m., with the following members present: E. W. Berger, K. E. Bragdon, H. S. Davis, G. M. Hunt, G. B. Merrill, Wilmon Newell, F. M. O'Byrne, Frank Stirling, and J. R. Watson. Visitors present were C. A. Weigel, and C. A. Bennett.

The paper of the evening was by J. R. Watson on the Origin and Hosts of the Camphor Thrips. After an extended discussion of the paper Mr. C. A. Weigel, who has been conducting a general survey of the thrips situation in Florida for the U. S. Bureau of Entomology, outlined the plans for the camphor thrips campaign about to be undertaken by the Bureau under an appropriation of $5000. Following this Mr. C. A. Bennett, who is to have direct charge of the control work, made a few remarks. Meeting adjourned at 6:30.

H. S. DAVIS, Sec'y.

Some damage is being done by pumpkin bugs and cotton stainers (*Nezara viridula* and *Dysdercus saturellus*) to citrus and other crops. After the adult pumpkin bugs have gotten onto the fruit the only known remedy is to collect them in large nets. The cotton stainers may be killed with a good strong oil emulsion or soap solution sprayed on the trees. Mr. Mosnett has found that spoiled avocadoes cut in half make excellent traps for them. While congregated on the avocado they may be sprayed with kerosene.

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DECEMBER, 1919
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*MOSQUITOES FOUND ABOUT GAINESVILLE, FLA.

By U. C. LOFTIN

MOSQUITOES AND DISEASE

Malaria has been known for a long time, but it is only recently that it has been shown to be caused by a sporozoan parasite, belonging to the family *Plasmodidae*, and that it is transmitted by, and only by, Anopheline mosquitoes.

The idea that mosquitoes might spread malaria had been suggested many times, but it was not until 1898 that Dr. Ronald Ross, of the London School of Tropical Medicine, worked out the life history of the parasite causing "bird malaria" and found the spores developing in the stomach of the mosquitoes. A little later, Grassi, following Ross' theory, demonstrated the transfer of human malaria by Anopheline mosquitoes. Since that time, it has been confirmed by such a large number of workers that there can no longer be any doubt.

*This is the second installment of Mr. Loftin's paper and concludes Part I. The first installment was printed in the previous number. Part II, "Traps for Mosquitoes," will appear in the next number. All the figures for Part I were printed in the previous number.

Theobald (1901) in his Monograph reports forty-two species of Anopheles from the world. There are eleven species found in the canal zone, at least five of which carry malaria (Darling, 1910). But we, in the United States, have only three that ordinarily carry malaria. These are *Anopheles punctipennis* Say., *Anopheles quadrimaculatus* Say., and *Anopheles crucians* Wied. (Howard, 1911), the last two being found in Florida.

While the etiology of malaria is well understood, few people realize the importance of it. They take it as a matter of providence that every one in the South should have it and that it does not amount to much. Indeed, it is very difficult to estimate the damage it does. But Herrick (1903) says that malaria is responsible for more sickness among the white population of the South than any other disease. Howard (1907) points out that from the meager data available, the death rate from malaria in the United States amounts to fifteen per hundred thousand, or twelve hundred per year, and that two-thirds of this is in the South. Although there are no records available for this state, Florida, with its semitropical climate, summer rains and large areas of flat lands, undoubtedly has its share. But the death rate alone does not begin to show the importance of the disease. Howard (1909) says:

"But with malaria perhaps as with no other disease, does the death rate fail to indicate the real loss from the economic point of view. A man may suffer from malaria throughout the greater part of his life, and his productive capacity may be reduced from fifty to seventy-five per cent, and yet ultimately he may die from some entirely different immediate cause. In fact, the predisposition to death from other causes brought about by malaria is so marked that if, in the collection of vital statistics, it were possible to ascribe the real influence upon mortality that malaria possesses, this disease would have a very high rank in mortality tables. Writing of tropical conditions, Sir Patrick Manson decided that malaria causes more deaths, and more predisposition to death by producing cachetic states predisposing to other affections, than all the other parasites affecting mankind together. However, it has been shown that the average life of the worker in malaria places is shorter and that infant mortality is higher than in healthy places."

Malaria is undoubtedly the most prevalent disease among the students. The records of the University Infirmary show that for the present scholastic year (up to May 5, 1913) there were a total of seventy-two cases treated in the infirmary, thirty-one of which were for malaria. This is in spite of the fact that there is, among the students, a strong aversion to going to the infirmary and that only the more serious cases were recorded. The records show that the time spent in the infirmary for treatment varies from one to ten days, with an average of three and one-tenth, or a total for the year of ninety-six. But, as pointed out above, these records do not begin to show the loss of efficiency among the students, which is much higher than is shown by these bare records.

Yellow Fever

We have only to turn the pages of history to see how fatal an epidemic of yellow fever may be. In 1773, Philadelphia was nearly wiped from the map. In 1853 there was a severe epidemic throughout the South, New Orleans alone having a mortality of eight thousand. In 1878 another severe epidemic swept this region, and spread up the Mississippi Valley, causing twelve thousand deaths. In 1892 there were one hundred and ninety-two deaths at Pensacola, and more recently there was an outbreak, in 1905, in which nearly one thousand lives were lost. It was clearly demonstrated by Reed, Carroll, Lazear and Agromonte, a Board appointed by the Surgeon-General of the United States Army to investigate this disease, that yellow fever is carried by a mosquito, *Stegomyia calopus*. The work done in the recent epidemic, in 1905, shows that an epidemic can be stamped out by destroying these mosquitoes.

We have Stegomyia present in large enough numbers to cause trouble should an epidemic break out. I have killed as many as a half dozen in the laboratory in one afternoon, and for a while during the fall of 1911 they were very troublesome during the day at the Experiment Station. At present, there is no danger from them because we have no causal agent present to start an epidemic, but it may be introduced into Florida ports at any time, and this will be especially true with the increased trade incident to the opening of the Panama Canal.

Dengue fever is another mosquito-borne disease that is of increasing importance. Dr. J. H. Hodges, local agent of the State Board of Health, estimates that there were five thousand cases in this county alone last year. While this estimate is probably too high, it shows that this disease must be reckoned with in the future.

NATURAL ENEMIES OF MOSQUITOES

Some adult mosquitoes are destroyed by birds, bats, dragonflies, and other predacious insects, but their number is comparatively small.

A small mite determined by Dr. Nathan Banks as a Hydrachnid, close to the genue *Thyas*, has been found parasitic on the body of Anopheles. During October and November, it was found attached to from ten to fifteen per cent of the *Anopheles* caught, but never in a single instance to *Culex*. As many as eight and ten have been counted attached to the thorax and abdomen of some individuals; but it is doubtful if any mosquitoes are killed by them.

The larvae are more easily preyed upon and we have some enemies that are very effective in holding them in check. There are a few water beetles, especially in the sinks, that feed upon the larvae. This community is a regular paradise for dragon-flies and there are from fifty to seventy-five species found. Anywhere around the grounds, on a quiet day, one can see scores of them. Their larvae feed upon mosquito larvae and being present in such large numbers devour many of them. Two well grown dragon-fly larvae have eaten thirty-five *Culex* larvae over night. Dragon-fly larvae have been found in the larger areas of water in all the marshes surrounding the University, but have not been found in the sink holes.

The most active enemies* we have are the little top minnows *(Gambusia affinis)* (Fig. 22, p. 22) and the "goggle-eye" or a warmouth bass *(Chaenobryttus gulosus)* (Fig. 23, p. 28). The usefulness of the top minnows has been mentioned by other writers (Howard 1902, Van Dine 1906). It is surprising how many mosquito larvae these little fellows will eat. A half dozen of them have eaten over a hundred Culex larvae in a couple of hours, and ten of them have eaten two hundred larvae (all that were fed them) for several days in succession. They are very active and one has only to stand quietly on the bank to see them as they patrol the water every few minutes. They have been found in the deeper portions of all the marshes, the sink holes, ditches, and wherever there is a permanent supply of water. Their small size enables them to go almost anywhere and to work their way in among the vegetation. Wherever they are found is a poor place to look for mosquitoes. They have been found in only one instance in the same pond with mosquitoes. This was in a circular depression covering four or five acres, lying about a mile northwest of the University. The depression is shallow and the slope from the bank toward the center is very gradual. It is overgrown with water weeds and in some places the edges are surrounded with sphagnum moss. *Anopheles* larvae were found abundant in some places among these weeds and moss. In some cases, the weeds and moss were so thick that the water could not be seen at all and it looked as though the larvae were actually

*Determined by Dr. H. S. Davis.

resting upon the moss. The minnows were all about the edges, but in some places the vegetation was too thick for even them. Wherever a little open water was found, there were the minnows but no mosquito larvae. They are very hardy and are entirely capable of freeing and keeping free from mosquitoes, any area of permanent water. They can be very readily introduced into ponds and aquaria that are not already stocked with fish of some kind. They are oviparous and breed all the year, so a few only would be necessary for a start.

In the sink holes we have also the "goggle-eye" which is predaceous upon mosquito larvae. Four of these ate two hundred full grown larvae and ten *Gambusia* in four hours. Another record shows that they ate one hundred and fifty *Culex* and thirty-five *Gambusia* within forty-eight hours, and still another that they ate three hundred *Culex* in one hour. The sinks are well stocked with them. I have several times caught fifteen or twenty in an hour with a hook and line. In about one hundred specimens caught, this was the only species found. They do not seem to prey upon Gambusia naturally, for both are found abundant in the same sink. It was very fascinating to watch one of these fish, six inches long, chase a tiny wriggler. They seem very hardy and can be kept in an aquarium without much trouble. These and *Gambusia* keep the sink holes entirely free. I have several times during the year, carefully examined the sinks without ever finding a single larva.

PREVENTIVES FOR MOSQUITOES

This subject is naturally divided into two parts. Preventives for (1) Adults and (2) Larvae. There are endless protective fluids that have been recommended for protection from the bite of the adult. These usually contain some essential oil such as oil of citronella, castor oil, pennyroyal oil, kerosene, oil of tar, etc., and many are undoubtedly repellant to mosquitoes. But all of them are more or less disagreeable to use and have to be frequently renewed to be effective, and, all in all, they are a poor makeshift.

Screens and canopies afford great protection, but as ordinarily used do not keep out all of the mosquitoes. Examination of rooms in Thomas Hall has shown as high as thirty mosquitoes present, ten of which were *Anopheles (crucians* and *quadrimaculatus).*

This is in spite of the fact that the dormitories have as good screens as money can buy, showing how hard it is to keep mosquitoes out if they are present.

Smudges of almost any material that give a dense smoke have been used and, if the smoke is thick enough, will keep adults away should anyone prefer to be suffocated rather than bitten to death.

Fumigants will quickly rid a house of the pests and are very useful in some instances. Sulphur dioxide, made by burning two pounds of sulphur per thousand cubic feet, has been the standard in the past and is absolutely reliable but it is objectionable to use on account of its injurious effect upon household goods. Pyrofume, a product obtained from the fractional distillation of pine wood, seems to be as effective as sulphur dioxide and less objectionable to use (Francis, 1906). Mimms' culicide, made by mixing equal parts by weight of melted carbolic acid crystals and camphor gum, used at the rate of four ounces per thousand cubic feet is entirely satisfactory but expensive. In experiments conducted by the writer, it killed all the *Culex quinquefasciatus* which were confined in the room in a battery jar covered with cloth. It is much easier to use and not so injurious as sulphur dioxide. Tobacco smoke will quickly kill mosquitoes confined in a tight receptacle. As tobacco is so universally distributed and cheap, it would be very convenient to use if it would form an effective fumigant. In experiments conducted by the writer, the great difficulty was in burning it so as to make a smoke. When alcohol or saltpeter was mixed in sufficient quantities to burn it, it would burn without making much smoke and was not effective when burned in a tight room at the rate of two ounces per thousand cubic feet. It is believed that if some device for burning tobacco so as to make a dense smoke can be perfected, it will form a cheap and efficient fumigant. Perhaps something like the "smoker" used for bees could be used successfully.

Tobacco decoction (containing about two and two-thirds per cent nicotine) was tried in a tight room containing about seven hundred cubic feet of space. Twenty-five cubic centimeters were evaporated over a gas burner and one hundred and four *Culex quinquefasciatus* exposed to the fumes for thirty minutes. All of them were stupefied, but when removed to fresh air, about seventy-five per cent revived. Another experiment was made in which ninty-five cubic centimeters were evaporated in the same room and about fifty *Culex quinquefasciatus* exposed to the fumes for one hour. In this experiment none of them were killed. Some trouble was found in evaporating this much of the decoction, as it forms a thick syrupy mass and vaporized slowly. It is thought that "Black Leaf 40" which contains nicotine sulphate can be used to much better advantage, but none was available for experiment. As it contains about fifteen times as much nicotine per volume as the other decoction, probably no difficulty will be experienced in evaporating a sufficient quantity to kill the mosquitoes if it proves effective.

Oil of turpentine was tried as a fumigant, but it caught on fire so the experiment was discontinued. It burned with a dense smoke which completely filled the room, but did not kill the mosquitoes. Green camphor leaves dried in an oven and burned at the rate of two ounces per seven hundred feet were not effective.

It is important that the evaporating vessels for any fumigants be placed near the floor, otherwise the mosquitoes near the floor will not be harmed, as the fumes are lighter than air.

PREVENTIVES FOR LARVAE

Preventive and remedial work against the adults is desirable and often very effective, but it is only temporary and does not destroy the root of the trouble. It is better, in all cases where it is possible, to either kill the larvae or to destroy or render uninhabitable the breeding places. It is more satisfactory and usually cheaper in the long run to destroy the breeding places. The peculiar habits and structure of the larvae make it possible to kill them rather easily with substances called "larvacides." These substances float on the surface, forming a film which prevents the larvae from reaching the air with their breathing tubes. Various substances have been tried and many have given good results, but considering everything, petroleum products have proved the most satisfactory. It was suggested as early as 1812 that kerosene was effective in killing larvae, but the use of it did not become very general until about 1895. Since then it has been used extensively with good results. H. W. Weed rid the campus of the Mississippi Agricultural College of mosquitoes by oiling eleven water tanks. Professor Kellogg found that by pouring a little kerosene in some post holes that the mosquito plague was almost immediately alleviated at Leland Stanford University. Mr. W. C. Kerr did some extensive work on ponds and swamps on Staten Island, and Dr. J. B. Smith reports its successful use in two cases on Long Island. An oil suitable for this work should be light enough to spread rapidly and yet heavy enough not to evaporate too readily. A low grade oil known as fuel oil has been found best suited for this. Mr. H. J. Quayle (1906) used a mixture of a heavy, eighteen degree Baume, oil and a light, thirty-four degree

(Continued on page 48)

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FLORIDA BUGGIST

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TRICHOGRAMMA MINUTUM TO THE RESCUE

The issue of the Weekly News Letter of the U. S. D. A. for January 14 bears a reassuring message to the great corn belt. It has been found that the European Corn Borer seriously damages only sweet corn and the smaller varieties of flint corn, and that only in regions where the insect has two generations per year. In at least the northern part of the chief corn belt only one generation per year has appeared. Also little damage is done where weeds are kept down in corn fields, fence rows and waste places. And lastly, the above named common hymenopterous parasite is attacking a large percentage of the eggs. However, no one knows how many generations the insect would produce during a Florida season, nor its effect upon our flint corn and sugar cane.

PLANT COMMISSIONER WILMON NEWELL, PRESIDENT OF THE ECONOMIC ENTOMOLOGISTS

Our society was signally honored at the St. Louis meeting of the American Association of Economic Entomologists by the election of one of its members as president of that association.

In celebration of this honor some of his Florida friends tendered to Prof. Newell a surprise banquet on the evening of January 12. There were present some fifty guests from the University faculty and Plant Board offices, including the entire Plant Board (alias Board of Control). Mr. Hodges of Lake City, president of the Plant Board, acted as toastmaster. Toasts were responded to by the members of the Plant Board, the president and faculty of the University.

ANNOTATED LIST OF THE INJURIOUS AND BENEFICIAL INSECTS OF THE AVOCADO IN FLORIDA*

By G. F. MOZNETTE
Entomological Inspector, U. S. Department of Agriculture

INJURIOUS INSECTS

Trialeurodes floridensis Q.—The Avocado White Fly. Like citrus, the avocado also possesses its particular white fly. This species attacks the avocado in the more protected growing sections as does the Dictyospermum Scale. It is smaller than any of the citrus white flies, possesses white wings and a pale yellowish body. The pupae are readily distinguished by having a characteristic fringe. It multiplies rapidly during the summer months, and causes sooty mold in considerable abundance where present. The avocadoes growing along the keys and ocean shore are more particularly attacked by this white fly than are those growing on the mainland. Trees in the nursery which are more or less protected often become badly infested with this species. The species is present in Florida wherever avocadoes are grown.

Tetranychus yothersi McG.—The Avocado Red Spider Mite. The red spider mite which attacks the camphor in the northern part of Florida, seriously attacks the avocado at certain times of the year. This is particularly true during the dry winter months. This mite, when abundant, gives a grove a very unsightly appearance, by yellowing and browning the foliage. It is the only red spider mite known to the writer which lives and performs its depredations on the upper surface of the foliage.

Heliothrips hemorrhoidalis Bouche.—The Greenhouse Thrips. This species, which is so common in greenhouses in the northern states, attacks the avocado in Florida in the open, and is present in varying numbers throughout the year. It becomes seriously abundant in places on the approach of dry weather in the fall and winter, and is capable of doing considerable damage by causing defoliation. It works on the upper surface of the foliage as does the avocado red spider mite. It also attacks the fruit when it becomes numerous. Like the white fly of the avocado it multiplies more rapidly in the orchards situated on the keys and beach places in southern Florida.

Chrysomphalus dictyospermi, Morgan.—The Dictyospermum Scale is a small circular scale of a light brown color. It is particularly abundant on the avocado in the more protected places, and where the temperatures are more even. Especially is this true along the ocean shore and keys. It attacks the branches killing many of the smaller limbs, but when abundant may often kill the tree.

Saissetia oleae, Bernard.—The Black Scale becomes particularly noticeable in avocado groves on the keys and ocean front, especially during the fruit forming period, by congregating in masses about the stems of the fruits. Here it produces honey dew which accumulates on the fruit in which the black sooty mold develops necessitating washing of the fruit. Fruits so attacked by this scale bear weak stems and invariably drop prematurely. It does not apparently become abundant on the mainland.

Pseudococcus nipae, Mask.—The Cocoanut Mealy Bug becomes noticeable

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at times on the avocado in certain sections where it has become established. It attacks the foliage particularly.

Pulvinaria pyriformis, Ckll.—The Pyriform Scale. This species, where present, does considerable damage to the avocado. It is brownish in color, rounded or ovate in shape, and on maturing, when the egg sacs are produced, a cottony material pushes out from under the edges of the scale. It produces an abundance of honey dew for sooty mold to develop. The scale is prevalent wherever the avocado is grown, especially on seedling trees growing in neglected yards.

Frankliniella cephalica var. *masonii*, Watson.—This species of thrips which is light yellow in color attacks the avocado in the bloom. The writer has observed that the West Indian varieties growing in groves along the keys and on the mainland become infested with it. The thrips deposits its eggs in the pedicel of the flower clusters. These punctures at times are very numerous, depending on the variety of avocado, causing the flower cluster to drop. The species differs from the citrus thrips in being considerably lighter in color.

Empoasca minuenda, Ball.—The Avocado Leaf Hopper. This leaf hopper which is exceedingly small and yellowish in color attacks the avocado foliage by sucking the plant juices. It confines its attacks to the lower surface of the leaf and causes white spots to appear on the foliage viewed from above. When very numerous, this species will give an avocado tree a decidedly whitish appearance. It is particularly abundant on the avocado during the growing season.

Gracilaria sp. near *niolacella* Clem.—The Avocado Leaf Roller. This small greyish moth is present wherever avocadoes are grown. It deposits its eggs on the new growth. The larvae which hatch from these eggs curl the foliage on which they feed. The foliage on maturing develops unevenly giving the tree a decidedly ragged appearance, especially is this true when this species is abundant. The larvae are small and yellowish in color.

Dysdercus suturellus H. Schf.—The Cotton Stainer. This is one of the plant bugs and often attacks the fruit of the avocado in considerable numbers. The species congregates on the fruit where it injures it by puncturing and sucking the plant juices. The punctures afford entrance places for plant diseases to enter and develop. It is only in certain years that this insect appears in the groves.

Acysta perseae Heid.—The Avocado Tingid. This species, which feeds upon the juices of the foliage of the avocado, is a small lace bug. The insect causes the leaves to appear yellowish and drop. The species is not widely distributed, however.

Anomala undulata, Mels.—This small beetle, or leaf chafer, visits the avocado groves in swarms during the blooming period in southern Florida during certain years. It is nocturnal in its habits, coming out from the soil at night and devouring the bloom wherever present. Its depredations last only a week or so, the adults returning to their breeding grounds. It is not known where they breed. This species is capable of doing considerable damage.

Caulophilus latinasus.—This small brownish weevil, which resembles the grain and rice weevils, attacks the seed of the avocado in the orchard in fallen fruits and wherever seed is stored for planting purposes. The larvae and weevils completely tunnel the seed rendering them worthless.

Sparganothis (Platynata) sp.—A moth, which is of a light brown color, deposits its eggs in the avocado blossom cluster. The larvae which hatch from these eggs in turn tie the blossom cluster together with their webs to form a nest; the larvae feed on the flower parts. This insect has not been noticed in large numbers nor is it widely distributed. Wherever they should become abundant, they would be capable of considerable injury. The larvae when full grown are about a half inch in length and a dark green in color.

Lypsimena fuscata, Lec. and *Elaphidion inerme,* Newm.—These two Cerambycid beetles attack the dying or unhealthy branches of the avocado. This is true especially after a freeze. If the dying branches are allowed to remain the borers or larvae often burrow down into the healthy tissue beyond the axis of the branches.

A number of scale insects of minor importance have at times been noticed on the avocado doing damage to individual trees. Some of these are the Common Mealy Bug, *Pseudococcus citri* Risso; Florida Wax Scale, *Ceroplastes floridensis* Comst.; Hemispherical Scale, *Saissetia hemisphaerica* Targ.; and the European Fiorinia, *Fiorinia fioriniae* Targ.

BENEFICIAL INSECTS

A number of beneficial insects, either predatory or parasitic on the previously named injurious insects of the avocado in Florida, are as follows:

Sympiesis dolichagaster, Ashm.—Represents a parasite which keeps the avocado leaf roller in check to a considerable extent. It is a small greenish colored hymenopterous insect.

Chrysopa lateralis, Guer.—This lace wing fly is present on the avocado in considerable numbers at the time the avocado red spider mite is present in abundance. The larvae of this species carry with them a protective covering of small particles which is characteristic of some lace wing flies. The larvae devour large numbers of the red spider mites.

Franklinothrips vespiformis, Crawford.—This is a large species of thrips. It is black with a whitish band and is very active on the foliage when disturbed. It is present in large numbers on the avocado in the late winter or early summer. The larvae and adults of this thrips destroy large numbers of all stages of the avocado red spider mite. The adults resemble ants on the foliage. It is also predatory on the larvae of *Heliothrips hemorrhodalis* Bouche' and the nymphal stages of *Empoasca minuenda* Ball. It attacks the avocado white fly, *Trialeurodes floridensis* Q., in the larval and pupal stages as well as the egg stage. This thrips is peculiar in its habits in that it spins a cocoon, on the lower surface of the leaf, in which the larva pupates. The larvae are a deep red in color also possessing a whitish band on the body.

Scymnus utilis, Horn.—This insect is commonly found among the red spider mite colonies on the avocado. It is a small lady bird beetle about the size of a pin head, black in color. With the beetles may be found their dark brown larvae, also feeding on all stages of the red spider mite. This species is very beneficial.

Scymnus kinzeli, Casey.—Another lady bird beetle. It is larger than the former and is bicolored, abdomen black and head reddish. It is never abundant, however.

Leptothrips mali, Hinds.—This is a large black thrips and is very active on the foliage. When disturbed it elevates its body as if going to sting.

It is not abundant, and is found predatory in both the larval and adult stage on the avocado red spider mite.

Prospaltella sp.—This species is a small hymenopterous parasite, frequently bred from the pupal and larval stages of the avocado white fly, *Trialeurodes floridensis* Q.

Cryptognatha (Delphastus) pallida, Lec.—This a small lady bird beetle, light brown in color and about the size of a pin head. It is one of the Scymnus group. The larvae are whitish in color. Both the larvae and adults are very beneficial, being predatory upon the avocado white fly in the larval and pupal stages.

Scolothrips sexmaculatus, Pergande.—This thrips, which is light in color, possesses six spots on the abdomen. It was not found by the writer to be abundant and feeds when present in both the larval and adult stages on all stages of the avocado red spider mite, *Tetranychus yothersi*, McG.

Aspidiotiphagus citrinus, Craw.—A hymenopterous parasite found to be destroying considerable numbers of the dictyospermum scale, *Chrysomphalus dictyospermi*, M.

MOSQUITOES FOUND ABOUT GAINESVILLE, FLA.

(Continued from page 43)

Baume, oil in some pool and creek beds that could not be readily drained, with good success. He found this to be efficient for from one to four weeks, depending upon the nature of the pond and the exposure to the wind. To be on the safe side, the pond should usually be oiled every two weeks. He used a barrel spray pump in the accessible places and a knapsack pump in the others to good advantage, but it may be simply poured on from a sprinkler or applied from a bucket with a mop. In inaccessible swamps, it is sometimes applied by standing a barrel on end and boring a small hole near the bottom so there will be a constant drip.

In the Panama Canal work there was considerable difficulty in getting the oil to completely cover the surface when the vegetation was thick. There they found a solution made from one hundred and fifty pounds of sulphuric acid, one hundred and fifty pounds of powdered resin, and thirty pounds of caustic potash boiled together made a good larvaecide (Gorgas 1909), which, in some cases, was more effective than fuel oil.

A pool on the campus between Buckman and Science Halls, and the septic tank back of Thomas Hall, have been treated with "Zenoleum" disinfectant twice. This forms a milky mixture with the water and kills the larvae in a short time. Both pupae and larvae were found alive four hours after application, but all were dead next morning. No record was obtained of how much was applied, but enough to make the water appear decidedly milky. It was found to prevent egg laying for about twelve days, and should be applied about every two weeks.

Ordinary kerosene is commonly used when only small areas are to be oiled. It is more expensive than crude oil and not any more effective.

Any system of oiling has to be done every few weeks during the year, which in the long run, proves expensive. It is cheaper after all to drain the breeding places, as they then require very little attention.

Drainage

Drainage has become more popular in recent years and large areas, that it would have been thought foolish to attempt to drain a few years ago, have been successfully drained. Perhaps the most extensive work has been done in the New Jersey salt marshes by Dr. J. B. Smith (Smith 1901-1911). Salt marsh mosquitoes are long distance flyers (forty miles in some cases) and large areas had to be drained to control them. Something of the magnitude of the work in general is gathered from the following figures. Up to 1911, about thirty thousand acres had been drained and nearly four million feet of ditches dug at a cost of about $75,000 (Smith 1911). Wherever this work has been done, the mosquitoes are practically eliminated and it has proved successful in every way. This work has been accompanied by considerable oiling, as is usually the case, to give immediate relief, and in some places where it was not practicable to drain.

Numerous other cases of the eradication of these pests and the diseases they carry, by these remedial measures are on record. Prior to 1905, a house to house inspection showed that twenty per cent of the population in some parts of Staten Island were suffering from malaria. Anti-malaria work was undertaken, and in 1909 there were only five cases of malaria reported (Howard 1910). Dr. E. P. Felt (1905) states that Lawrence, Long Island, has been freed from the salt marsh mosquitoes. H. J. Quayle (1906) reports some very satisfactory work against the salt marsh mosquito near San Francisco. The Lawrence, L. I., Board of Health (1903) has done good work which has rid their town. Havana, Cuba, has been cleared of yellow fever and made habitable by anti-mosquito work done under direction of the United States Medical Army Corps. The epidemic of yellow fever in New Orleans, in 1905, was stamped out by clearing the city of mosquitoes. Some of the most successful, as well as the most difficult anti-malarial work, has been done in the Panama Canal Zone. Under the French administration this was a veritable death trap. The tales told of the deaths are almost unbelievable; in fact it was difficult to keep enough men there to keep records. When the Americans took charge, the first thing done was to organize a Department of Sanitation to clear the zone of mosquitoes and fever. This has been so successful that it is now considered a health resort. Their hospital reports show (Gorgas 1913) that their monthly average of cases sent to the hospital for malaria was only ninety-two hundredths of one per cent of the entire force, while similar records at the University show ten per cent.

These facts leave us no room for doubt as to the efficiency of these methods. If Staten Island and Long Island, surrounded by water; if New Jersey with her thousands of acres of marsh and mosquitoes flying forty miles, and Panama with her tropical rains and with excavations made by buildings, can be freed from mosquitoes and malaria, why cannot most towns in Florida? They can.

STRATEGUS WANTED—Am making a special study of this genus, of the Scarabeidae, and should be very glad to receive Florida specimens, especially of the rarer species. Will exchange or pay cash. Address W. Knaus, McPherson, Kansas.

The
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*MOSQUITOES FOUND ABOUT GAINESVILLE, FLA.

By U. C. LOFTIN

Part II.—Traps For Mosquitoes

During the fall and winter of 1912-1913, the writer, at the suggestion of Dr. E. W. Berger,** conducted some experiments with traps for adult mosquitoes. These experiments have been recorded in an unpublished thesis, submitted at the University of Florida. The principle results are summarized here. The traps (simplified forms of the one used by Lefroy) were vessels and boxes, dark inside and of several sizes and shapes, placed where the mosquitoes would be likely to use them for hiding places in the early morning. A successful style was a plain earthenware jar, or crock, such as is often used for churns, six to eight inches in diameter, sixteen to eighteen inches high, dark chocolate to black inside (Fig. 27).

*Third and final consecutive installment of Mr. Loftin's paper.

**Dr. Berger first used the traps during June and part of July, and then placed his records at the writer's disposal.

Another type that gave good results was wooden boxes, seven by seven inches square by thirteen inches deep, painted black or dark green inside, or lined with black or dark green cloth. A joint of six-inch stovepipe was also used with good results. Other sizes, shapes and colors of crocks and boxes were used, but it was found that the traps of small diameter and a depth of twice the diameter gave the largest catches. No noticeable difference was found between the black and the dark green cloth, but the cloth lined boxes gave slightly better results than the painted ones. It is well known that mosquitoes seek a dark place in which to hide during the day and anything that furnishes this condition and is nearly air-tight so that they can be easily killed with a fumigant can be successfully used. Mosquitoes, in common with living things in general, are positively phototactic up to a certain degree of light intensity, and negatively so after this is exceeded. With mosquitoes this optimum, or turning point, is commonly met a little before sunrise.

The traps were placed in various positions and kept uncovered during the night. They were covered from 7:00 to 7:30 in the morning, before the direct rays of the sun reached them. A board or piece of stiff cardboard makes a good cover, but the best and most convenient cover found was a wooden frame covered with wire gauze with a piece of cardboard cut to fit. This cover allows an examination of the contents and the addition of the killing agent without any danger of escape. Gasoline was found to be the cheapest and most effective fumigant. It was added at the rate of ½ teaspoonful per gallon capacity of the crock, and about twice this amount for the boxes, when they were covered in the morning, the amount depending somewhat upon the temperature, more being required on a cold day when vaporization was slower. From fifteen to twenty minutes was found sufficiently long to leave the traps covered. If the specimens are to be kept for future study, no more gasoline than will readily vaporize should be added, for otherwise the specimens will be wet and bedraggled. If they are not to be kept, a pint of boiling water poured into the crock quickly kills them.

The position of the trap is very important and upon it depends its success or failure. Most of the tests were made on porches (Fig. 31) at 203 W. Ninth Street, South, and 2300 W. Hernando Street, Gainesville, Fla., but traps were tried for short times at several other dwellings in Gainesville, and in the dormitories and Experiment Station Building of the University of Florida.

The West Ninth Street house faces west with a porch extending entirely across the front. The woodwork is painted

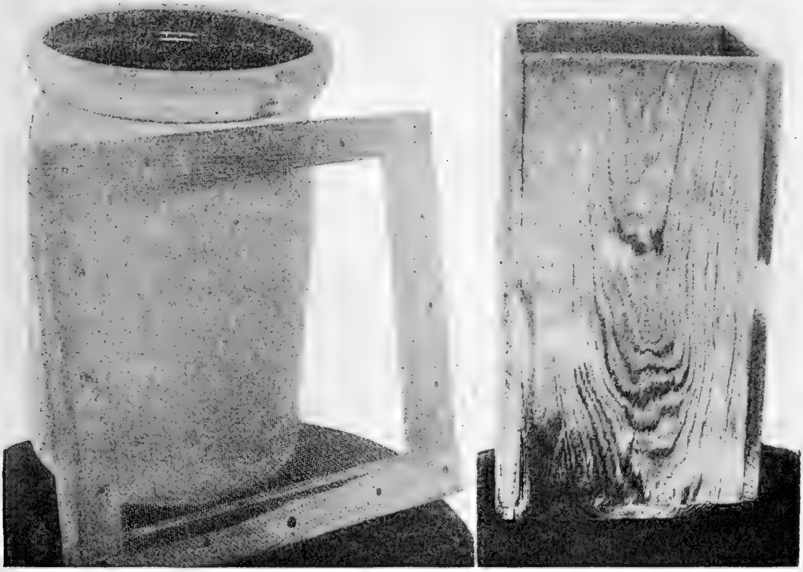

Plate V. Fig. 27. Crock, or earthenware jar, and box that gave good results as traps. Leaning against crock is shown cover consisting of a frame and fine wire netting.

dark green and the porch has a solid coping around it and a wire trellis for vines at either end. There are two double windows and a door opening on to it. The porch and the position of the traps are shown in the diagram, Figure 31a. Traps were placed on the south end of the porch on the east side next the wall (SE:bc); on the west side next the coping (SW:bc) and at a point midway between the two. On the north end they were located on the east side near the wall (NE:bbb).

The house at 2300 W. Hernando Street is situated about one-fourth mile northwest of Thomas Hall, University of Florida. It faces south with a front porch and a side porch part of the way along the east side. The woodwork is white with a door, a single window, a double window opening on the front (south) porch and two single windows on the side (east) porch. There is a corner two feet east of the door that projects outward a couple of feet and a trellis of wisteria shades part of the front and side porches. The traps were located at the right and left of the door (D:rl); at the windows on the front (south) porch (W:bbb); and on the north end of the east porch (N:cb). See diagram, Fig. 31b.

The importance of the position of the traps is strikingly shown in Table I, which gives the records of two similar crocks situated on the south end of the West Ninth Street porch. One was on the east side near the wall (SE:c) and the other not eight feet away on the west side near the coping where it was more exposed to light (SW:c) (see Fig. 31a). The table gives the average number caught per night for a five and six months period, from October to March. (There is no record for the crock near the coping for November, hence this is for a five months period only.)

TABLE I.—THE EFFECT OF POSITION ON THE NUMBER CAUGHT

Position of Crock (c)	Months Recorded	Average No. Per Night
W. 9th St. at SE:c (1)	6	21.2
W. 9th St. at SW:c	5	11.3

(1) See Fig. 31.

This large difference is explained as follows: As day approaches the outer edge of the porch becomes light first and the mosquitoes move towards the darker side, next the green wall, and eventually settle in the traps. The house also breaks the wind on this side and the air is calmer. This tendency to go toward the darker side is also shown near the door at 2300 W. Hernando Street (Fig. 31b). A crock was placed on one side of the door and a joint of stovepipe on the other throughout the winter. Records for an average of ten nights in March show that when the crock was on the right it caught 1.56 times as many as the stovepipe on the left and that when the stovepipe was on the right it caught 1.47 times as many as the crock. This is in spite of the fact that a flower stand and a box for rubbers, etc., was always on the right and a considerable number always settled here. The conditions here are somewhat similar to those at West Ninth Street. The projecting wall shuts off the early light from the east and the wisteria vines, which end about opposite the trap, shut off the light from the front, leaving this a darkened corner. The effect of a large dark place where the mosquitoes can hide was shown at another house. The back porch is latticed, but not screened, and mosquitoes are plentiful. A crock set in various places on and about the porch gave almost negative results, as most of the mosquitoes settled in a large dark cupboard in a corner of the porch. This being larger and equally as dark as the jar seemed more attractive. In a bedroom at 203 West Ninth Street, where the furniture and walls are light colored, four or five, and at once time a dozen mosquitoes were caught when they were not numerous enough to be troublesome, while in the dormitory, where the woodwork is dark and there are closets and bookcases for them to hide in, never more than three or four, and often none, would be caught, even when they were too numerous for comfort.

No data were secured on the relation of the direction of the wind to the number caught, but the catch was always greater on a still than on a windy night. But as a high wind was usually accompanied by a drop in temperature, this may account for most of the difference. The effect of temperature was noticed throughout the winter, a high catch always coming with a rise in temperature. The curve in Figure 32 shows the temperature recorded and the number caught in a green cloth-lined box on the porch at 2300 West Hernando Street during February, and the close correlation between the two. The temperature of February was the coldest and most variable of any month of the year.

Various substances such as apples, bananas, guavas, raw beef, urine, water, banana oil, etc., were placed in the traps as attractions, but none caused any appreciable increase in the number caught. Very definite results were secured, however, with repellants. The method employed was to place a small vial, or to pour a little of the substance to be tested in the bottom of the trap, and to have a similar trap about a foot away for a control, or check. The percentage of efficiency, as repellants, of three proprietary compounds, Bombay Vapor, oil of citronella and oil of tar, varied from 92.8% to 82% in the order named. Traps of this nature should prove useful in testing the efficiency of repellants because of the ease in which a control can be secured.

A daily record was kept of the position and the catch of the individual traps and the mosquitoes placed in vials or pill boxes for future study. Some of the specimens were destroyed by breakage, loss, destruction by ants, etc., but during the year 20,449 individual mosquitoes were caught and identified.

Table II gives the number of males and females, the per cent of females, the number of females with blood in the abdomen, the number of females with well developed ovaries,

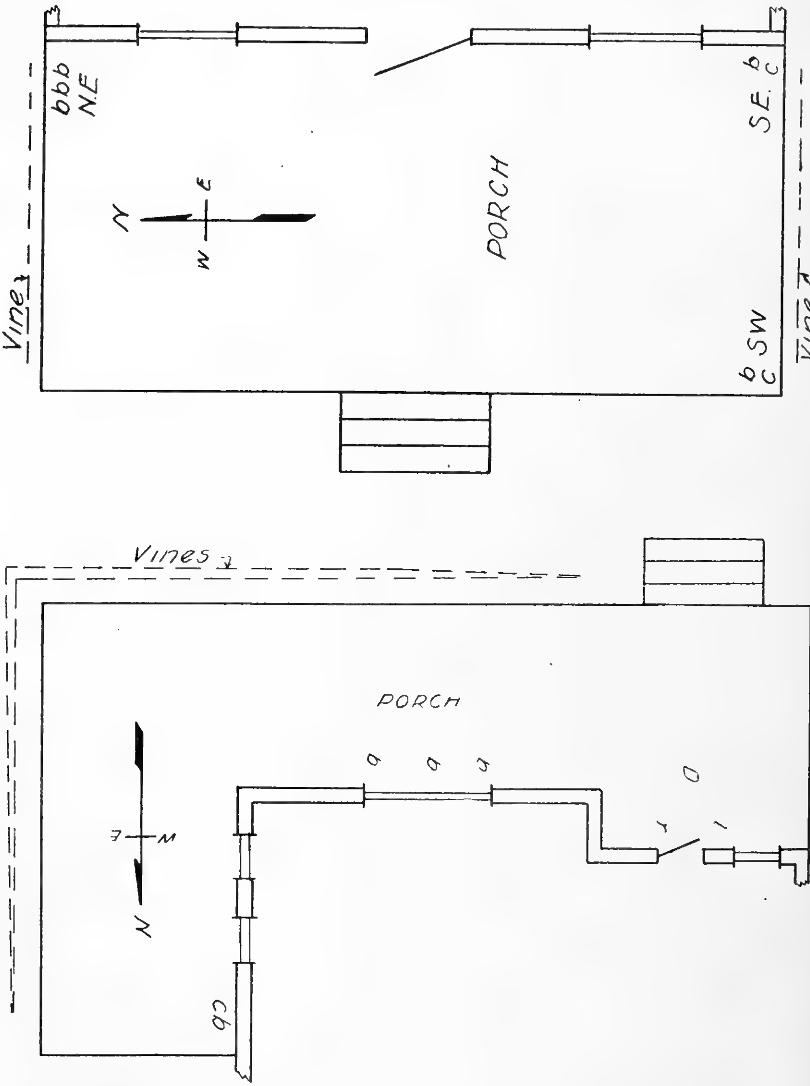

Plate VI. Fig. 31. (a) Smaller figure, diagram of porch at 203 W. Ninth Street South. Size of porch 9x26 ft. (b) Larger, L-shaped figure, diagram of porch at 2300 W. Hernando Street. Size 7 and 9 ft. by 28 and 18 ft. (b, c, r, l, stand for box trap, crock, traps right and left of door, respectively.)

the total number and the per cent of each species caught during the year.

TABLE II

Species Caught	Males	Females	Per cent of females	Females with blood in abdomen	Females with well developed ovaries	Total number	Per cent of total
Culex quinquefasciatus Say.	11723	8363	41+	839	1022	20086	98.30+
Anopheles quadrimaculatus Say.	26	171	86.8	11	18	197	.96+
Anopheles crucians Wied.	37	124	77+	8	12	161	.78—
Psorophora ciliata Fab.						2	.01—
Stegomyia calopus Meig.						3	.01+
Total	11786	8658	42.33	858	1052	20449	100.06

It is seen from the table that *Culex quinquefasciatus* is the dominant species but the percentage given is probably higher than is usually found. The relative abundance of the different species varies from time to time, but *Culex quinquefasciatus* usually comprises from 80 to 85% of those seen. During December very few *Culex quinquefasciatus* were seen at the Experiment Station, while Anopheles were common. Anopheles comprised from 15 to 20% and sometimes more of those collected by hand in the dormitories during October and November. No Anopheles were found resting on the window screens at 2300 West Hernando Street with the Culex until about December 1st. From December 1st until February 1st both species of Anopheles were found, but usually more *Anopheles quadrimaculatus*. Then *Anopheles crucians* became more abundant, comprising about 10% and sometimes more of all those seen. On March 29th, twenty-five *Anopheles crucians* and only two Culex were counted on the screen. Only an occasional individual was seen on the screens at 203 West Ninth Street, while they were always thick on the screens on the front porch at 2300 West Hernando Street, often as many as a hundred individuals being counted in the morning before they were disturbed. The wisteria vines shade the screens at the latter place while there is no such protection at the former.

Stegomyia was occasionally seen in considerable numbers about the building, but only three were taken throughout the

(Continued on page 67)

The

FLORIDA BUGGIST

Official Organ of The Florida Entomological Society, Gainesville, Florida.

PROF. J. R. WATSON .... Editor
PROF. WILMON NEWELL .... Associate Editor
DR. E. W. BERGER .... Business Manager

Issued once every three months. Free to all members of the Society.

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In accordance with a vote of the Society at its February meeting, THE FLORIDA BUGGIST will, with the new volume, become THE FLORIDA ENTOMOLOGIST.

Yes, and the Business Manager regrets that this change of name was made without at least a month's previous notice, and without getting the vote of the non-resident members. It is the writer's belief that changes of name of a publication should not be hastily made, especially when it is considered that THE BUGGIST has completed three years of an honorable record, being successful far beyond the anticipation of its originators. A few people, somewhere in the United States, have been critical of the name *Buggist,* and so the movers for a change, Buggists who visited the Entomological meetings at St. Louis in December, rushed home and *ology* it must be with "all other ologies whatsoever". Verily, like a rush to cover of chickens from a shadow.

If those who are similarly minded will voice their sentiments by writing at once to the Secretary, there is still time for reconsideration. If the name must be changed, the writer would suggest *The Florida Insectist*—a name that is new and different, and not stale.—E. W. B.

RECENT BULLETINS OF INTEREST TO OUR READERS

Bulletin 805, U. S. D. A., "Two Leaf-Hoppers Injurious to Apple Nursery Stock," by A. J. Ackerman. The author gives only one locality for the Bean Leaf-Hopper *(Empoasca mali)* in Florida, about Ft. Lauderdale. The insect is of course exceedingly abundant over the entire state and has been frequently cited in literature to that effect.

Farmers' Bulletin 1070 on the "Fowl Tick," by F. C. Bishopp. This tick has become established in several localities in Florida.

Ohio Station Bulletin 329 on the "Peach-Tree Borer", by Gossard and King.

PERSONALS

Messrs. J. H. Montgomery, F. M. O'Bryne, Frank Stirling, J. C. Goodwin and Wilmon Newell attended the meeting of the Entomological Society of America and the American Association of Economic Entomologists at St. Louis, December 29 to January 2.

Mr. K. E. Bragdon is now County Agent for Brevard County, with headquarters at Cocoa.

Mr. A. C. Brown, Assistant Quarantine Inspector for the State Plant Board, is now on duty at the Board's offices at Gainesville.

Mr. Clarence A. Bass, having received his discharge from the navy, is now doing nursery inspection work for the State Plant Board of Florida.

Mr. F. F. Bibby has recently received his discharge from the navy.

Mr. M. M. Bass is in charge of extensive grove properties near Ft. Myers, being associated with the Standard Growers' Exchange.

Mr. B. L. Boyden was a recent caller at the office of the State Plant Board at Gainesville, conferring with members of the Plant Board staff regarding the sweet potato weevil eradication work in Baker County, Florida.

Mr. Eli K. Bynum is engaged in farming at his home at Saltillo, Miss.

Mr. Virgil Clark, Inspector for the State Plant Board, took a vacation during the holidays and returned to Gainesville with a "better half".

Mr. Leon A. Daniel is at present employed by the Atlantic Coast Line in connection with fruit inspection service.

Mr. James Kerr has completed the citrus canker eradication work at Santa Rosa, Florida, and is now working with the nursery inspection forces of the State Plant Board.

Mr. Wilmon Newell spent several days during December on the east coast of Lake Okeechobee, in connection with the Plant Board's campaign against mosaic disease of sugar cane.

Mr. W. V. Millington is assisting in the port inspection service at Key West, for the Federal Horticultural Board and the State Plant Board.

Mr. Shirley B. Walker has been reappointed Assistant Nursery Inspector for the State Plant Board.

According to the Monthly Letter of the U. S. Bureau of Entomology, Mr. H. E. Loomis, who has just returned from service in the Marine Corps, has been appointed Assistant Entomological Inspector in the Division of Truck Crop Investigations with headquarters at Macclenny, Fla.

Another member of the staff of the Experiment Station, Professor S. E. Collison, the chemist, has resigned his position to go into commercial work in New York. The migration of the older experienced men from the faculties of our universities and other scientific institutions into commercial lines has reached the proportions of almost a stampede and is a most alarming state of affairs which is bound to seriously affect the value of these institutions for decades to come. Our public schools, with their constantly shifting personnel among the teachers, furnish a shining example of the evils that result when teachers look upon their positions as a mere temporary occupation to be dropped as soon as something better can be secured. While all true scientific workers labor for the love of science, still they must eat and their families, if they have been rash enough to follow the teachings of the eugenicists and raise one, must be fed, clothed, and educated. In many cases this has become impossible on a salary whose purchasing power has been cut in two since pre-war days.

Thos. H. Jones, Entomological Assistant, U. S. Bureau of Entomology, and a member of our Society, who maintained for a few months at Ft. Myers a laboratory for the study of insects of truck crops, has returned to Louisiana. The station at Ft. Myers has been abandoned.

Mr. Weigel, of Washington, D. C., recently visited Satsuma and Gainesville in the interest of Camphor Thrips work.

Mr. E. F. DeBusk, formerly County Agent for Orange County and until recently with the Wilson Toomer Fertilizer Company, at Winter Haven, has accepted a position as Assistant Boys' Club Agent with the Extension Division of the College of Agriculture.

The unofficial nursery inspection duties of F. M. O'Byrne have been increased. Boy, 10 pounds.

REPORTS OF MEETINGS

October 27. Meeting was called to order in Language Hall at 4:30 by Vice-President Merrill. There were eleven members and visitors present. The paper of the evening was on the Japanese Beetle, by Mr. Wilmon Newell, State Plant Commissioner. The speaker gave a description of the adults and illustrated it with specimens. He also outlined the life history. Only the adult form is especially injurious. They skeletonize the leaves of a large number of plants, especially ornamentals, and are very destructive. It was introduced from Japan about ten years ago and at present is confined to a limited area in New Jersey, but is rapidly extending its range each year. Owing to inadequate control measures there is great danger of its being widely disseminated. The speaker stated his belief that the beetle would become a very severe pest if introduced into Florida.

November 24. The meeting was called to order at 4:30 by President O'Byrne with fourteen members present. Out of town members present were J. E. Graf and B. L. Boyden. The following new members were elected: M. D. Cody, University of Florida; Thos. H. Jones, Bureau of Entomology; U. C. Loftin, Federal Horticultural Board. The paper of the evening was by Dr. J. H. Montgomery, Quarantine Inspector, on "Some Phases of the Quarantine Work of the State Plant Board". The speaker emphasized the great danger of introducing injurious insects into Florida. There is especial danger of introducing the Citrus Flack Fly from Cuba on account of inefficient control measures. There is also great danger of introducing the European Corn Borer from New England on straw used for packing. The insect, if introduced into Florida, would probably attack sugar cane. The outlook is very promising for the eradication of the sweet potato weevil from Baker County. Every effort is being made to prevent the spread of the weevil to portions of the state not now infested. He concluded by calling attention to the real danger of introducing severe pests from Central and South America and to the fact that little is known concerning the insects in those countries.

Mr. G. B. Merrill, Assistant Entomologist, thtn gave an account of the work of the Entomological Department of the State Plant Board in connection with the quarantine inspector's task. Specimens sent in by the inspectors are identified if possible, but in some cases it has been necessary to refer the material to the U. S. Bureau of Entomology or elsewhere.

Under the head of "Timely Notes", Mr. Frank Stirling, General Inspector State Plant Board, gave an account of the large hornets' nest constructed during the summer at the home of President A. A. Murphree. The hornets *(Vespa canadensis)* had constructed a nest about eight feet long and several feet wide under the eaves. They were destroyed by a misty spray of kerosene and the nest removed.

Prof. J. R. Watson exhibited a map which he had prepared showing the months of average maximum and minimum precipitation thruout the state. This map showed that the rainy season starts in June in the south central part of the peninsula and spreads in both directions from this center during the four succeeding months, concluding in Palm Beach and Dade Counties in October. He also showed specimens of a new thrips, *Trichothrips drakei,* which is remarkable for its size, 3 mm.; and also specimens of the Puss Moth, exceptionally large numbers of the caterpillars of which have been sent to the Experiment Station during the fall.—H. S. Davis, Secretary.

January 26, 1920. Meeting of the Society was called to order by the Vice-President, Mr. Merrill, at 4:30 P. M. Present the following: Newell, Berger, Stirling, Merrill, Watson, Montgomery, Stone, Goodwin, Davis, Fattig, Schlobig, and Brown, members; and Mr. Dely Hunt, guest.

Minutes of the previous meeting were read and approved.

This being the first meeting of the new year, annual election of officers was held. Mr. Geo. B. Merrill was elected President; C. M. Hunt, Vice-President; J. H. Montgomery, Secretary; and Dr. Davis, member of the executive committee. The business and editorial staff of the official organ of the Society, THE FLORIDA BUGGIST, were re-elected. It was moved and passed that the retiring President, Mr. F. M. O'Byrne, be requested to deliver the annual presidential address at the February meeting of the Society.

Dr. E. W. Berger, Business Manager of THE FLORIDA BUGGIST, presented a report on the financial condition of that publication. This report was received, accepted and filed.

Dr. J. H. Montgomery discussed the pink bollworm situation in Texas with more particular reference to the efforts being made by the federal and state authorities to handle the situation. The discovery of reinfestation in some of the fields in southeastern Texas last fall has been the occasion for a conference of state officials held at Houston and Beaumont early in December. Dr. Montgomery reported that the situation, although discouraging and disquieting, is not necessarily alarming. No radical changes are contemplated in the eradication methods which have been made use of other than the extension of the period of quarantine on infested fields to cover a period of not less than two years.

Mr. Frank Stirling made a further report on observations made by him in connection with the destruction of a large wasp nest. This nest or colony had become established between the walls and under the eaves of the house of Dr. Murphree. Mr. Stirling and others undertook to destroy this colony with most satisfactory results. The outstanding feature of this account was that the efficiency of the use of an oil fog to control the wasps during the destruction was demonstrated.

Dr. Berger, Entomologist, State Plant Board, made a preliminary report on the work which he is doing in producing pure cultures of the Cuban Aschersonia, a fungus found infecting several soft scales.

Under the head of new business, notice was given of a proposed change in the constitution to the effect that the Business Manager of THE BUGGIST shall also act as Treasurer of the Society. Under the constitution a change can only be made by a two-thirds vote of the members present at a meeting held thirty days subsequent to the giving of notice of the proposed change.—J. H. Montgomery, Secretary.

February 23. Meeting of the Society was called to order, the President, Mr. Merrill, in the chair. Members present: Mr. Merrill, the President, in the chair. Members present: Newell, O'Byrne, Chaffin, Goodwin, Brown, Stirling, Watson, Schlobig, Berger, Montgomery and the President.

Minutes of the previous meeting were read, corrected and approved.

The paper of the evening was read by Mr. O'Byrne, retiring

President, his subject being "Standardization of Nursery Inspection Rules and Requirements".

Notice of the proposed amendment to Article III of the Constitution of the Society having been given at the last previous meeting the proposed amendment was presented to be voted upon. The amendment was adopted and read as follows:

> "The officers shall consist of a President, a Vice-President, a Secretary and a Treasurer. There shall be an executive committee consisting of the President, Secretary and one other member. The officers shall be elected at the annual meeting in January."

Under the head of new business, Dr. Montgomery presented for consideration of the Society a proposition to change the name of the official organ of the Society. There was considerable discussion which was participated in by practically all members present, and after considering various suggestions decision was finally arrived at that the name of the publication be changed from THE FLORIDA BUGGIST to THE FLORIDA ENTOMOLOGIST, this upon motion of Mr. O'Byrne, seconded by Dr. Montgomery.

Under Timely Notes Mr. Watson, Entomologist Florida Experiment Station, displayed specimens of a spider, the "black widow", *Latrodaectus mactans.* This is said to be the most poisonous of the spider family known in Florida.

Mr. Goodwin reported a newspaper item indicating that the pink bollworm had found lodgment in Louisiana near the Texas line.

Dr. Berger made further report on production of Cuban Aschersonia, *Aschersonia cubensis,* and two or three other fungi (names not known). Dr. Berger reported that the growth of these cultures was very much slower than the yellow and red aschersonias.—J. H. Montgomery, Secretary.

OUCH!

On the first page of Bulletin 87 of the Arizona Agricultural Experiment Station occurs the following remark: "Many farmers now located in Arizona have had experience with it (the boll weevil) in Texas, Oklahoma and other states of the *so called cotton belt*" (italics mine).

MOSQUITOES FOUND ABOUT GAINESVILLE, FLA.

(Continued from page 59)

year in the traps. Psorophora were usually rare, but comprised about 75% of a lot collected by hand or found dead on the window sills of the Agricultural Building. They were sometimes troublesome at night during May in Science Hall. Two or three specimens of Megarhinus were collected, but were never taken from traps.

The percentage of females caught in traps is much lower for Culex than for Anopheles. Smith (1) has pointed out that male mosquitoes do not fly as far as females and that more females than males enter the house. He collected some outside and some inside the house, a total of 1,350, representing several species. Of these taken outside, only a small percentage (10-23%) of those breeding considerable distances away were males, while 60% of the *Culex pipiens*, which were breeding locally, were males. Of a total of 318 individuals taken within the house, Smith did not find a single male. Lefroy (2) caught an average of 21.8% females in a similar trap set inside the house.

Culex were found breeding closer to both houses than Anopheles.

TABLE III.—AVERAGE NUMBER CAUGHT PER MONTH IN SIMILAR CROCKS AT BOTH STATIONS

Month	Average Number Caught Per Night	
	203 W. Ninth St. S.	2300 W. Hernando St.
September, 1912	21.0	30.1
October	44.2	78.7
November	14.3	23.2
December	14.2	32.0
January, 1913	12.0	15.0
February	14.5	25.0
March	31.1	49.0
April	12.2	30.0
May	10.5	22.3
Average per year	19.3	33.9

The number given as having blood in the abdomen included only those in which the blood was undigested and could be seen through the abdominal walls as a dark clot. All of those with the abdomen plump and distended, where no blood could be seen, were counted as having well developed ovaries, though some of them were probably distended with other food.

(1). Smith, John B., Annual Report of the Entomologist, Report of the New Jersey Experiment Station for 1902.
(2). See "Literature Cited".

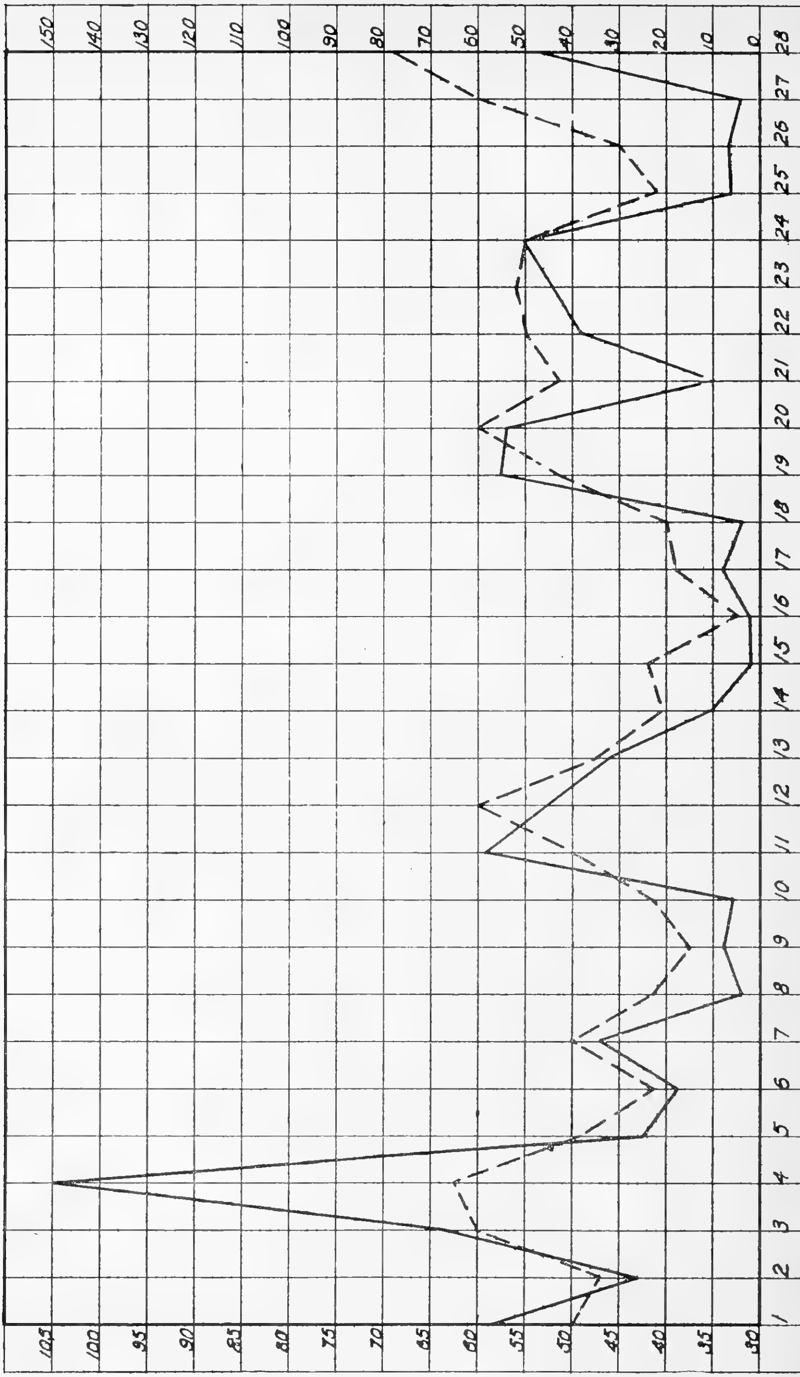

Plate VII. Fig. 32. Curves showing correlation between temperature and the number of mosquitoes caught per night during February, 1913. Figures at left and dotted line denote temperature, degrees F.; figures at bottom denote days of the month; figures at right and solid line denote the number caught. Porch, 2300 Hernando Street, corner Waukulla Avenue, Lot 1, Block 5, College Park Plat, Gainesville, Fla. Trap, a box (see Fig. 27) lined with dark green cloth.

In twenty-five dissections, however, all contained well developed eggs, the number varying from 30 to 130, depending upon the size of the specimens, with an average of 80.5 eggs.

In Table III is given the monthly average number caught per night in similar crocks situated on the southeast end of the porch at 203 West Ninth Street (Fig. 31a SE:c), and on the right side of the door at 2300 West Hernando Street (Fig. 31 b:r).

PRACTICAL USE OF TRAPS

Traps of this nature may not rid a place of mosquitoes, nor even reduce the number enough to make them unobjectionable. But in favorable positions, they will catch large numbers and certainly could be used as a controlling factor. The average number caught throughout the year (September to May) by a single crock at 2300 West Hernando Street, was 33.9 per night. This would give a total of over twelve thousand for the year. Suppose one thousand houses in Gainesville should run two of the traps, one on the front porch and one on the back porch, for a year. This would rid the city of twenty-four million pests—I dare say more than have ever been killed by artificial means within the city in the last ten years. Certainly they are not so plentiful in Gainesville that these twenty-four million would not be missed. But even this is not all; each female caught during the winter and spring is cut off from becoming the progenitor of at least a thousand others during the summer. If every home would cooperate by running one or two of these traps, at least during the winter and early spring, the number of mosquitoes present would probably be greatly reduced.

Such traps also afford a very convenient means for testing the efficiency of repellants and determining the relative abundance of mosquitoes at different seasons.

SUMMARY

1. All of the mosquitoes found at the University breed locally, but the breeding areas are small and could be drained with the expenditure of a small amount of money.

2. Traps used for adults, when favorably located on porches, have caught an average of thirty-three mosquitoes per night for nine months.

3. Crocks and boxes, black inside or lined with dark cloth,

have given the best results. They should be rather narrow and deep.

4. The success or failure of traps depends on the location. They should be placed in a well lighted room or porch, which is free from dark cupboards, closets, etc. The best position is determined by experiments.

5. High winds affect the number caught, but temperature is the most important factor. The largest numbers caught were on warm still nights.

6. Not all species are equally attracted to the traps. *Culex quinquefasciatus* is attracted more than Anopheles or Stegomyia.

7. These traps are not recommended to rid a place of mosquitoes, but if used with judgment they will reduce the number present in the house or outside. Such traps are also useful for collecting mosquitoes for specimens, demonstration or class uses, or for testing repellants.

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KEY TO NORTH AMERICAN SPECIES OF PHYSOTHRIPS

(Continued from page 32)

The genus *Physothrips* is part of the old genus *Euthrips* which name Karny (1909) has shown should be applied to the genus *Anaphothrips*. The species formerly included under *Euthrips* are now divided between four genera which may be separated by the following key:

1. Tibia with a strong, curved spine on the end..........*Odontothrips* Serville
2. Tibia without such a spine.
   - a. Wings with transverse bands..................................*Taeniothrips* Serville
   - aa. Wings without transverse bands.
     - b. Bristles on the fore angles of the prothorax conspicuous. *Frankliniella* Karny
     - bb. Bristles on the fore angles of the prothorax not conspicuous. *Physothrips* Karny

KEY TO THE NORTH AMERICAN SPECIES OF PHYSOTHRIPS

(Adapted from Jones, 1912)

1. General color white to light yellow or orange. Head noticeably wider than long.
   - a. Last two segments of antennae rather long and slender, and together about 2-3 as long as segment 6. Wings shaded brown except near base and apex..*P. orchardii* (Moulton)
   - aa. Last two segments of antennae not long and slender, about ½ as long as segment 6. Wings not shaded brown.
     - b. Ring vein and longitudinal veins conspicuous. Wings dilute yellow ....*P. costalis* (Jones)
     - bb. Ring and longitudinal veins not conspicuous. Wings white. *P. albus* (Moulton)
2. General color brown.
   - a. Head nearly as long as wide; no prominent bristles in front of posterior ocelli..*P. longirostrum* (Jones)
   - aa. Head noticeably wider than long; a prominent spine in front of each posterior ocellus.
     - b. Eyes not pilose; postocular bristles present; antennal segments 3 and 4 not pedicellate; posterior longitudinal vein of fore wings with 13 spines..*P. ehrhornii* (Moulton)
     - bb. Eyes sparsely pilose; post-ocular bristles absent; antennal segments 3 and 4 pedicellate; posterior longitudinal vein with 11 or 12 spines..*P. blacki* n. sp.

"Here's to the chigger
That isn't any bigger
Than the point of a very small pin,
But the lump he raises,
Itches like blazes
And there's where the rub comes in."

WANTED—A temporary laboratory assistant in the Department of Entomology of the Florida Agricultural Experiment Station. Address J. R. Watson, Gainesville, Fla.

STRATEGUS WANTED—Am making a special study of this genus, of the Scarabeidae, and should be very glad to receive Florida specimens, especially of the rarer species. Will exchange or pay cash. Address W. Knaus, McPherson, Kansas.

The

Florida Entomologist

(Formerly The Florida Buggist)

Official Organ of the Florida Entomological Society

VOL. IV SUMMER NUMBER NO. 1

JULY, 1920

THE MOSQUITO-MALARIA PROBLEM IN FLORIDA*

C. F. HODGE,
Extension Professor of Biology, University of Florida.

My extension work during the year has taken me from Pensacola to Miami and over a number of circuits in the northern and central sections of the state. In all of my trips a study of this problem has occupied a good share of my spare time; and I have come unexpectedly to one conclusion which greatly simplifies the solution of the mosquito problem. As an observer who accompanied me on one of my excursions expressed it: "We have been thinking and looking at the big places and have entirely overlooked the little places in which all of our mosquitoes really breed." A rain barrel, a green pool by the watering trough in the barnyard, or a pile of tin cans may not amount to the proverbial "drop in the bucket" compared to the nearby lake, marsh or cypress swamp, and still all the mosquitoes that infest the farm home, the village or town may be breeding in the former places.

Take a few typical cases. At Stuart I found at the rear of a

*Given before the June meeting of the Florida Entomological Society.

restaurant in the heart of the town a battered sheet iron wash tub, evidently used in its last stages as a garbage receptacle. It was about half full of filthy water. There were scores of mosquito egg-rafts on the surface and the water was alive with larvae and pupae. Mosquitoes were numerous, and there were probably many other similar breeding places, but enough mosquitoes were breeding in that one tub to supply the town. None were found breeding in any of the natural waters.

In Plant City, on the freight station platform, were seven barrels of water, all supplied with eggs and alive with wrigglers in all stages. They were pouring mosquitoes by the thousands into the business center of the city. The septic tank on the outskirts of the city was also found breeding mosquitoes, literally, I think, by the millions. This is a problem for the city engineer. No breeding whatever was found in ditches or bay heads during a number of examinations extending from March through the first half of May.

Dade City furnishes an especially instructive example. Near the A. C. L. depot are extensive water-lily ponds that look from the distance utterly hopeless. Careful examination, however, along their marshy borders, in the worst looking places, revealed only top minnows everywhere and no mosquitoes breeding whatever. Mosquitoes were breeding abundantly in tin cans and rubbish of a large dump alongside of one of these ponds.

The worst night I had during the whole year was spent in a room of a hotel in Haines City. There were inside screens supposed to cover the lower half of the windows, but both lower sashes were immovably stuck about half way up. This left two cracks the width of each window thru which all mosquitoes attracted to the windows could pour into the room. I spent the entire night killing the pests and estimated the casualties roughly at between four and five thousand. In the morning I determined to find out where those mosquitoes were breeding. Diagonally across the street from the hotel was the railroad station and on the freight platform, as usual, were barrels of water, five in this instance. One of these had oil on it. The other four were covered with a solid scum of mosquito eggs and empty pupa cases, and hundreds of mosquitoes could be seen in the act of emerging from the water. The capacity of one of these barrels, I should think, might be 200,000 mosquitoes every ten days. I was told, as usual in such cases, that those barrels didn't amount to anything compared with the numbers that were breeding in the lake.

Again careful examination of the most likely places along the lake shores revealed only schools of minnows and other natural enemies and no mosquito larvae. A boat drawn up to the shore with some water in it showed one or two rafts of eggs and a few young wrigglers. If left a few weeks it might become a breeding place.

I might give many more illustrations that prove the same point. Of course being a stranger and spending, usually, only one day in a place, it was impossible to make a systematic examination of all the backyards, henyards and barnyards of a town; but I have found in most towns the water barrels on the freight platforms breeding enough mosquitoes to make life a burden to the entire community.

Bringing the matter home to us here, mosquitoes, both Anopheles and Culex, are now numerous on the University campus. A recent survey, while not as yet complete, certainly adds evidence to support the position above advanced. At the meter box north of Buckman Hall, where the water mains come in from West University Avenue, both Anopheles and Culex larvae were found in considerable numbers. Many more of both kinds are breeding in the stagnant water that has collected in the bottom of the swimming pool. Culex in great numbers were found in the water pans in the poultry yard back of the kitchen. A few Culex were found in a trash can at the barracks. Culex by thousands were found in a barrel of fertilizer water back of the Experiment Station barn and also in a barrel half full of water near the mule stable. Considerable numbers were breeding in the watering tubs at the dairy and especially, as most of the faucets are dripping continually, in the pools that form on the ground around them. The cement watering troughs and wallowing basins in the hog yards close by contained numbers of wrigglers. On the other hand the three sinks, the small stream in the kitchen garden, and the effluent from the septic tank were all examined and no mosquitoes discovered in them. My observations coincide, in the main, with those reported by Loftin in recent numbers of THE FLORIDA BUGGIST, although he does record finding a few mosquito larvae in "marshes", "ditches" and "sphagnum swamps" where the moss and weeds form wet masses too dense for top minnows to penetrate. And I do not wish to be understood as meaning that mosquitoes do not commonly breed in natural as distinguished from artificial waters. I have many times found them breeding in numbers in the mountain bogs of

Oregon and the Rockies, in the prairie sloughs of Montana and the Dakotas, in the river sloughs and marshes of Wisconsin, and in the swamps of New England. It is thus with the greater surprise that I have found the natural surface waters of Florida so free from them. There is a valid biological reason for this in the fact that Florida waters are so abundantly stocked with natural enemies. Minnows swarm in sinks to all appearances entirely separated from other surface waters. Dragon- and damsel-flies, often called "mosquito hawks", are everywhere in Florida and their aquatic larvae, all carnivorous and active, voracious feeders, make short shrift of mosquito wrigglers in any pools that may be inaccessible to minnows. Then there are the water-bugs, water-scorpions, water-striders, water-boatmen and the whole series of predaceous water-beetles policing both surface and bottom of every pool, stream or lake margin. If man would consistently do his part, I am convinced that natural enemies would effectively do theirs in holding mosquitoes in check in Florida.

How can the people do their part? One home may breed mosquitoes to cover an area at least two hundred yards in diameter. How can we get every home, rich and poor, black and white, to do its share for its own comfort and safety and for that of the whole community? The solution of this problem means more to Florida socially, educationally and financially than possibly that of any other problem in the state. The statistics of our own State Board of Health give a death rate from malaria for 1919 of 41.8 per 100,000 of population; while for other states in the registration area the rate was only 3.2 (for 1917). We try, at least, to provide by law that every citizen shall learn to read and write. Of the two, in Florida, I should prefer to live next door to a man who could not read, if he knew how to prevent the breeding of mosquitoes on his premises, to living alongside of a university professor who didn't know and wouldn't learn enough to do this. Adequate and universally required science lessons in every grammar and high school in Florida offers the only practicable solution for the problem I can find. In what other way can we hope to reach every home?

Probably not one adult in ten has ever seen mosquito eggs, to know them, or has clear ideas about the life history of the insects. Every school child can be given this information in a single well developed science lesson. These lessons are clearly outlined in available books; but the pupils should collect and study the actual specimens wherever possible. Every school child will then be able to *know* whether or not mosquitoes are breeding anywhere about the home.

The children should be provided with adequate equipment for this work. How many school children have insect nets? (Insect nets, inexpensive and easily made by the children themselves, for collecting in both water and air, were demonstrated.) Here is a weapon with which anyone can sweep up all the mosquitoes in a room in a few minutes. I have saved many a night's sleep with this simple device and have promised myself never to be without one in my future journeys in Florida. With our insect damage tax of over $1,500,000,000 annually every child ought to have and use the insect net during some part of every year of his school course.

Loftin, in the articles referred to, has described mosquito traps that may help in the solution of our problem. These traps are black or dark boxes or crocks set in favorable places about porches and are designed to take advantage of the instinct of mosquitoes to hide in dark holes during daylight, and considerable numbers might be trapped in this way. But we may be pardoned for asking whether the providing and daily tending of these traps might not entail more expense and labor than the entire work of doing away with the breeding places. These traps, too, seem to me to be lacking somewhat in definite attracting power. Are there not always too many other dark places in the dense foliage of trees, weed patches, vines and shrubbery—known to be the natural hiding places of mosquitoes? And could we hope by any arrangement of such traps to catch but comparatively few of the entire number about the premises?*

In making my experiments upon trapping stable flies I think I have caught at least as many mosquitoes in a single night in a single stable window trap as Loftin caught in all his traps in a year. Of course they happened to be there to catch that night, and no real comparison with the Loftin traps is intended. In this case a cow just inside the window supplied adequate attraction. In regions where extensive natural breeding places cannot be drained, filled or oiled, or stocked with fishes, such traps might readily be designed to catch all the mosquitoes that were attracted to house or stable windows, the occupants serving as "bait" but in no danger of being bitten. The traps would not be ex-

*As we understand it, Loftin's traps were intended only for use in closed rooms and exposed porches where natural hiding places for mosquitoes are few or absent.—Ed.

pensive and would catch bushels as easily as dozens, if they were there to catch. They would also be automatic and require no attention except to empty when full. Related as they would be to the one passion of a mosquito's life, the thirst for blood, if we could protect our domestic animals and ourselves with such traps during the hours when mosquitoes are active, we might save not only quantities of blood but catch practically all the breeding mosquitoes within flying distance. In general it is probably true that a mosquito does not produce eggs until she has drawn a meal of blood; so this method, if we could cover all the local sources of blood supply, might yield practical extermination. Quite possibly, too, differences in the mosquito attracting power of different animals might help in the good work. A cow, horse or mule might be found to attract practically all of the mosquitoes away from the wild birds, frogs and toads of a region. Of course these latter suggestions apply only to such places, if any exist in Florida, where extensive natural breeding waters are beyond present possibilities of control and should not be permitted to confuse or obscure the main point of this discussion. This is, that any community in northern Florida and the central part of the peninsula can completely rid itself of mosquitoes and malaria, at practically no expense, just as soon as it can secure the intelligent cooperation of every home in doing away with the strictly artificial and domestic breeding places of the pests. This does not apply to localities within flying distance for migratory species of either the Atlantic or Gulf coasts.

Beginning at home, the University campus should be made and kept absolutely free of mosquitoes. Then Gainesville might well be made a shining example and be in a position to tell other cities exactly how the work was accomplished.

The railroads are all bidding for tourists and settlers and if the attention of officials were called to this matter, orders from headquarters might quickly put a stop to mosquito breeding upon their property.

This is, of course, but a brief summary of the results of my first year's observations on the mosquito-malaria problem in Florida. I am fully convinced, however, that any farm home or community that acts on the above suggestions will be most agreeably surprised at the results. At any rate, will it not be good common sense to be absolutely sure that all the little domestic breeding places are attended to before undertaking expensive draining or oiling operations of swamps and ponds?

(See "Note", p. 14.)

AN APPARENTLY NEW HAPLOTHRIPS FROM CUBA

J. R. WATSON

Haplothrips merrilli, n. sp.

Color: Brown, tarsi and antennal segments 3 and 4 yellowish brown.

Measurements: Total length 1.14 mm.; head, length 0.14 mm., breadth 0.114 mm.; prothorax, length 0.113 mm., breadth 0.20 mm.; mesothorax, breadth 0.19 mm.; abdomen, breadth 0.21 mm.; tube, length 0.086 mm., width at base 0.048 mm., at the apex 0.023 mm.

Antennae: Total length 0.245 mm.

Segment	1	2	3	4	5	6	7	8
Length	25.0	33.0	38.0	37.5	35.4	32.5	32.0	21.4 microns
Breadth	26.7	23.5	20.0	23.0	20.6	20.0	15.5	10.6 microns

Head longer than wide and longer than the prothorax; cheeks slightly convex, sides almost parallel; vertex rounded; surface smooth. Postocular bristles rather long but pale and inconspicuous, knobbed. A pair of smaller bristles in the middle of the dorsum, one at the inner angle of each eye and one behind each posterior ocellus. Eyes rather small, occupying about ⅓ the margin of the head and .6 the breadth; dark red; not pilose; facets small. *Ocelli* much larger than the facets of the eyes; red; bordered by heavy, dark red crescents; situated far forward, the posterior pair opposite the anterior ⅓ of the eyes and close to their margins but not touching; anterior far forward, facing forward. *Mouth cone* reaching .5 or more across prosternum, labium well rounded. Antennae 8-segmented, 1.7 times as long as the head. Segment 1 broad at the base, truncated; 2 constricted near the base into a broad stalk, cut squarely off at the apex; 3 broadly vase-shaped with a rather narrow stalk at the base; 4 oval, broad, short-stalked; 5 and 6 barrel-shaped with a short broad stalk; 7 oblong with a broad base; 8 conical. All provided with many short dark bristles. Sense cones short, colorless and inconspicuous. Three and 4 yellowish brown, the others concolorous with the head and body.

Prothorax a little shorter than the head, anterior margin slightly convex, posterior more so; sides diverging markedly posteriorly; coxae large and conspicuous. Surface free of sculpture. Long but colorless knobbed bristles on each angle and on each coxa; two pair near the posterior border, a smaller pair near the middle and a larger laterad, a small pair near anterior margin.

Pterothorax somewhat narrower than the prothorax (including coxae), sides slightly converging posteriorly; a few faint anastomozing lines near the anterior margin; 3 pairs of small bristles along the anterior margin and at least 6 pair along the sides. *Legs* rather long and slender. Fore femora considerably enlarged. Fore tarsi with a small curved tooth. *Wings* short, membrane reaching about to the fifth abdominal segment; fringing hairs very long, 5 interlocated ones.

Abdomen rather long and narrow, quite so in some specimens; a pair of pale, rather large, knobbed bristles on the posterior angles of each tergite, and three pairs of heavy, curved, dark, sharp-pointed spines on the outer third of each dorsal surface of segments 2-5; the innermost of these, along

(Continued on page 12)

The

FLORIDA ENTOMOLOGIST

Official Organ of The Florida Entomological Society, Gainesville, Florida.

PROFESSOR J. R. WATSON .... *Editor*
DR. WILMON NEWELL .... *Associate Editor*
DR. E. W. BERGER .... *Business Manager*

Issued once every three months. Free to all members of the Society.

Subscription price to non-members is $1.00 per year in advance; 25 cents per copy.

For this number Dr. C. F. Hodge contributes an especially valuable and timely article. There is little doubt but that the mosquito problem is the most important the state, as a whole, has to solve. And the most difficult part of the work is to dissipate the popular notion that little or nothing can be done about it; that mosquitoes are an inevitable part of Florida and therefore best ignored; that it is not good "boosting" to mention the subject; that they fly long distances and mostly breed in swamps and marshes whose drainage at this time is out of the question.

It seems to us that the best and quickest method of eliminating mosquitoes from a town is to hire a man who knows their breeding habits to see to it that no one allows mosquitoes to breed on his premises. We once lived in a town of 10,000 which paid a man to spend his entire time inspecting yards, alleys and vacant lots. That was a clean town and a favorite of tourists and health seekers. As Dr. Hodge remarked before the Society, "Few men can be trusted to know what is in their own back yards".

" * * * and ology it must be with 'all other ologies whatsoever' ". Seventeen letters expressing preference for FLORIDA ENTOMOLOGIST were received by the Secretary in response to the Business Manager's remarks on the change of name of THE BUGGIST (p. 60, vol. III); seven from inspectors in the Nursery Inspection Department (two not members of the Society, two with unpaid dues 2 and 3 years, two with unpaid dues 1920); four from the Quarantine Department (two with unpaid dues 2 years); two from Citrus Canker Inspectors (both dues 2 years unpaid); one grove manager (dues 2 years unpaid); one County

Demonstration Agent (dues paid); and two professional entomologists (dues paid).

It is known that at least one of the movers of the resolution of February 23, while on a trip in the state in June, advised on the matter with one or more of his assistants in the Sand Hill country. Seven responded (three addressing their letters in care of their boss); the next largest number also responded in perfect harmony; the two canker inspectors and an ex-canker inspector addressed their letters in care of their boss and ex-boss.

One writer is "Looking down through the annals of entomology"; another, quite poetical himself, accuses the editor of bursting forth in poetry, but fails to observe that the editor was responsible for neither the poetry on page 72 nor the remarks on page 60. Another "would want a good *english* word".

Now that we are dignified, will the movers of the resolution of February 23 see to it that the delinquent ones pay up their dues and the non-members become members of the Society? 23.—E. W. B.

PERSONALS

Doctor Newell. It was with peculiar pleasure that we read in Science for July 2, among the names of those upon whom the Iowa State College, at the June commencement, conferred the degree of Doctor of Science, that of our most distinguished and widely known member, Wilmon Newell.

Mr. C. A. Bennett, in charge of the camphor thrips investigations at Satsuma, has resigned from the U. S. Bureau of Entomology. He will engage in the garage business in Palatka.

County Agent Marcellus Javens of Lake County, has resigned.

Mr. R. N. Wilson, the first secretary of our society and until recently county agent at Riverside, Cal., now holds a very responsible position as secretary of a legislative committee for agriculture at Sacramento, Cal.

Mr. Thomas H. Jones of the Division of Truck Crop Insect Investigations of the U. S. Bureau of Entomology, who was located at Ft. Myers during the winter, has returned to Baton Rouge, La.

Mr. H. S. Dozier, who has held an entomological fellowship at Ohio State University during the past year, is now with the Mississippi State Plant Board.

There has been recently organized in New Orleans the Louisiana Entomological Society. This is the second entomological society in the South, ours being the first. Among the list of charter members we note the names of two of ours, Thos. H. Jones and O. K. Courtney.

A. C. Mason is now stationed at Orlando, Fla.

Virgil Clark has resigned from State Plant Board and now has charge of Narcoossee Branch of Buckeye Nurseries.

J. C. Goodwin, Chief Clerk State Plant Board, has resigned, effective August 15th. He will take post graduate work at Ames, Iowa, next year.

County Agent K. E. Bragdon has organized a "Bee Club" in Volusia County. The club is giving a picnic on July 16th and has invited Frank Stirling and Chas. Reese to give a talk on apiculture.

SOME RECENT PUBLICATIONS OF INTEREST TO FLORIDIANS

As senior author of Bulletin 833, U. S. Department of Agriculture on the Chrysanthemum Midge-Diarthronomia hypogaea (F. Low.) Dip.—we find the name of one of our members, Mr. C. A. Weigel.

The Canadian Entomologist for March contains a paper by W. S. Blatchley on "Notes on Winter Coleoptera of West and South Florida With Descriptions of New Species". On page 72 he mentions *Polypleurus geminatus* with the statement, "It has not been recorded from Florida". The beetle is included in Dozier's List of the Coleoptera of the Gainesville region.

Among recent Farmers' Bulletins, U. S. Bureau of Entomology, are the following: No. 1097, by F. C. Bishopp, on the Stable Fly. The author illustrates and describes in considerable detail Dr. Hodge's fly trap. No. 1037, by T. E. Snyderison, "White Ants", termites, or as they are commonly called in Florida, "wood lice". No. 1094, by V. L. Wildermuth, treats of "The Alfalfa Caterpillar" *(Eurymus euretheme)*. Although we have little alfalfa in Florida, the butterfly is common. It breeds on various other legumes. No. 1061, by F. H. Chittenden, also treats of a common Florida insect, the Harlequin Cabbage Bug. The map on page 6 "showing the distribution" is very incomplete for Florida.

It shows but two localities, whereas the insect is common the state over.

REPORTS OF MEETINGS

The regular March meeting was postponed until April 5. O. W. Boggs of St. Augustine, was elected to membership. The subject of the evening was "A Round Table Discussion of the Latest Ecological Map of North America and Especially Florida", led by Prof. Watson.

Under Timely Notes Prof. Watson called attention to a species of thrips *(Heterothrips aesculi* Watson—*H. azaleae* Hood), which has been found only in the blossoms of the Swamp Honeysuckle *(Azalea nudiflora)* and the Southern Buckeye *(Aesculus pavia)*. Prof. Watson called attention to the fact that, altho these two plants were not related, the shape of the two blossoms was very similar—long, narrow, dry tubes. He stated that this illustrated what seemed to be a general law governing the distribution of thrips. The physical characteristics of the various habitats of a species are always similar although the different hosts are often not at all related. He also called attention to the fact that a hedge of transplanted azalea on the station grounds had not yet become infested although it had been there several years, less than a quarter of a mile from infested buckeyes, showing that this species, like thrips in general, are slow travellers.

FRANK STIRLING, Temp. Sec.

April 26. Due to the amendment of Article III of the constitution separating the offices of secretary and treasurer, Dr. E. W. Berger was elected treasurer.

The Secretary read a communication received from Mr. John J. Davis, chairman of the National Museum Committee, American Association of Economic Entomologists, urging our Society to call to the attention of the Florida Congressional delegation the urgent needs of the National Museum. The President was instructed to name a committee of three to prepare representations.

J. H. MONTGOMERY, Secretary.

At the June meeting Dr. Hodge presented a report of his investigations of the breeding places of mosquitoes in Florida. (An abstract of this paper is printed in this number.)

The Secretary read a number of letters in regard to the change of name of the official organ of the Society. The majority of the writers were in favor of the name "FLORIDA ENTOMOLOGIST".

A resolution was passed directing the Secretary to call the attention of the State Board of Health to the breeding of mosquitoes on the property of the railroads and especially in the water barrels on the freight platforms.

Under Timely Notes Prof. Watson called attention to the apparent absence of the camphor thrips from the lower East Coast.

New members elected were: Max Kisliuk, Jr., Scientific Assistant, U. S. Marine Hospital, Wilmington, N. C.; J. G. Grossenbacher and R. E. Lenfest, both of Apopka, Fla.; Wm. E. Stone and Wm. H. Merrill, Agents Bureau of Entomology, U. S. D. A., Daytona, Fla.

AN APPARENTLY NEW HAPLOTHRIPS FROM CUBA

(Continued from page 7)

the posterior border, is especially large and curved sharply inward. Its length is fully ⅓ the width of the abdomen. Terminal bristles longer than the tube.

Male similar but smaller. The fore femora slightly enlarged.

Measurements: Total length 0.86 mm.; head, length 0.13 mm., breadth 0.10 mm.; prothorax, length 0.085 mm., breadth 0.165 mm.; mesothorax, breadth 0.17 mm.; abdomen, 0.16 mm.; tube, length 0.073, width at base 0.04, at apex 0.02 mm.; antenna, total length 0.28 mm.

Segment	1	2	3	4	5	6	7	8
Length	18.7	29.5	34.6	37.0	35.4	32.0	30.8	21.6
Breadth	22.15	22.7	19.2	20.0	19.1	17.2	14.2	9.6

Described from four females and three males collected by Mr. G. B. Merrill from under the cap scales of several cocoanuts taken at quarantine at Key West during March and April, 1920. Type in the author's collection. Paratypes in the National Museum and in that of the University of Florida.

This species is close to H. gowdeyi (Franklin), but differs in many characters, including the shape of the head, absence of striations, color of antennae and abdomen.

NEW THYSANOPTERA FROM FLORIDA—VII

J. R. WATSON

29. Haplothrips orlando Wats. & Osborn.

The original type of this insect (Florida Buggist, Vol. II, No. 4, p. 116) is a male. We now have two females and three additional males. These were collected by beating mostly "oak-runners" *(Quercus pumuli)* in the "flat woods" east of Gainesville, August 9. This is evidently a flat woods insect, as the ecological situation at the type locality near Orlando was similar.

Female. *Measurements:* Total length 1.8 mm.; head, length .21 mm., width .19 mm.; prothorax, length .18, breadth .32 mm.; abdomen, width .44 mm.; tube, length .145, width at base .055, at apex .04 mm.; antennae, segment 1, 40; 2, 53; 3, 67; 4, 62; 5, 53; 6, 50; 7, 49; 8, 48 microns; total, .40 mm. Color identical with that of the male; considerably smaller. Fore femora are but slightly enlarged. Tarsal tooth much smaller, in one ♀ entirely absent. A brown area at the extreme base of the wings. The number of interlocated hairs varies from 15 to 25, usually about 20. Type in the author's collection.

Male. The new males are considerably larger than the type, averaging 2.25 mm. in length. In some of them the tarsal tooth is scarcely half as large as in the type, and no larger than that of one female.

45. Haplothrips statices (Haliday).

Gainesville, Fla., July 10, sweeping in short grass along stream. In some of these specimens, as also in some the writer has from Massachusetts and Oregon, post-ocular bristles are present. In the original description and in Moulton's key they are said to be absent.

A CASE OF SERIOUS SICKNESS DUE TO THE PUSS MOTH CATERPILLAR

The editor recently received from Dr. H. D. Venters of the State Board of Health a caterpillar of the puss moth with the statement that "a boy almost died" from the effects of contact with the larva "which poisoned him similar to the bite of a rattlesnake".

Different individuals react very differently to the poison of various insects. The editor has frequently been "stung" by these larvae which are not uncommon in citrus groves. On him the effects were little more serious than those resulting from contact with a nettle or our common pretty "Horse Nettle" (Solanum sp.). Can it be that different specimens of the insect also vary immensely in the quantity or quality of their poison? We did not feel sufficiently positive on this point to care to handle that particular caterpillar.

Note—A recent visit to the Dudley place, a large stock farm thirteen miles west of Gainesville, offered the most conclusive proof of my main point as to the ease with which mosquitoes may be controlled. Here we have ideal natural breeding pools all about and scores of farm animals to supply blood and still for three nights I slept between two large windows, wide open, shaded by shrubbery and without screens or netting of any kind without once hearing the song of a mosquito. Keeping the rain water barrels and the cistern stocked with minnows, one or two in each barrel and five or six in the cistern, and strict attention to all watering troughs had completely solved the problem.—C. F. Hodge.

WANTED—To buy or exchange for northern species, southern Chrysopidae (Lace-winged-flies). All stages desired, especially material for biological studies. Will determine specimens. Dr. Roger C. Smith, U. S. Ent. Lab., Charlottesville, Va.

The
Florida Entomologist
(Formerly The Florida Buggist)
Official Organ of the Florida Entomological Society

VOL. IV FALL NUMBER NO. 2
SEPTEMBER, 1920

LUMINOUS BEETLES OF FLORIDA

To the Editor of The Entomologist:

I have been interested in the habits of various groups of Coleoptera for some time, and thought I would write you regarding a subject which might be of interest to the readers of The Entomologist relative to luminous beetles in Florida. The average layman is quite familiar with the fact that certain species of the beetles are luminous and this knowledge is invariaby connected with the group commonly known as "fireflies" or Lampyrids. Whenever a beetle flashes a light at night invariably it is acclaimed a "firefly". In Florida we have two species of luminous Elaterids scientifically known as *Pyrophorus phsoderus* Germ. and *Pyrophorus atlanticus* Hyslop. I have recently collected a large series of *Pyrophorus atlanticus* Hyslop in this section of Florida. The species was observed flying at dusk of day in fields where species of the so-called "fireflies" were also present. The distinction between the luminous Elaterids and Lampyrids is observed in both the location of the luminous organs and their habit of flash. The Elaterids have their light vesicles situated on the pronotum while those of the Lampyrids or "fireflies" are situated on the ventral of the posterior segments of the abdomen. The flash of the Lampyrids is intermittent while at flight while that produced by the Elaterids is quite constant. It was also observed that the males of *Pyrophorus atlanticus* Hyslop were present in greater numbers on the wing while those of the opposite sex were scarce in comparison and were for the most part resting on the foliage displaying a light at times quite constant, apparently waiting the coming of the males. The flashes of the Elaterid were only to be observed but a short while at the dusk of day while the Lampyrids continued their activities into the night.

I am merely writing about this subject thinking that it will be of interest to the readers of The Entomologist. Two other species of luminous Elaterids occur in the United States, one in Arizona and the other in Texas, while Florida possesses two species.

Very truly yours,

G. F. MOZNETTE.

(Miami, Fla., Aug 1920.)

NEW THYSANOPTERA FROM FLORIDA—VII

J. R. WATSON

(Continued from page 13)

60. Haplothrips gracilis n. sp.

Length about 1.4 mm. Color brown with much orange hypodermal pigmentation; head dark brown; fore tibiae and all tarsi yellowish brown.

Measurements: Head, length 0.24 mm., width 0.12; prothorax, length 0.115, width including coxae, 0.20 mm.; pterothorax, width 0.20 mm.; abdomen width, 0.20 mm.; tube length 0.08 mm., width at base 0.045 mm., at apex 0.027 mm.

Antennae, segment	1	2	3	4	5	6	7	8
Length in microns	24	36	37	35	37	37	33	24
Width in microns	28	24	21	24	24	20	18	11

Total length 0.25 mm.

Head: Length about ⅙ longer than wide, cheeks nearly straight, slightly converging posteriorly, postocular bristles dilated into a small head, rather shorter than the eyes. *Eyes* small, occupying about one-third the length of the head, rounded, not protuding, not produced on the ventral surface. Posterior ocelli opposite the anterior one-third of the eyes. *Antennae* nearly twice as long as the head. Segments all short and thick; 2-6 about equal in length; 1 and base and inner border of 2 concolorous with the head; remainder of 2, and 3 yellowish brown; 4 darker; 5-8 dark brown. *Mouth Cone* rounded at the apex.

Prothorax nearly as long as head and nearly twice as wide as long, a long and short bristle on each posterior angle and a conspicuous one in the middle of each side, all capitate. *Pterothorax* about as wide as prothorax. Wing membrane with a brown area at the extreme base, plainly narrowed in the middle. Fringing hairs sparse but long, no interlocated ones. *Legs* rather short, fore tibiae slightly enlarged, tarsi devoid of teeth.

Abdomen long and slender, 4.5 times as long as broad, prominently banded with dark brown and orange, sparsely provided with bristles some of which are capitate and some pointed. Tube about half as long as the head.

Described from a single ♀ taken from ironweed (Vernonia) at Gainesville Aug. 7, 1919.

The species is remarkably close to *H. bellus* Hood and Williams in most characters but is longer (smaller in most measurements except the abdomen); the eyes are not produced on the ventral side; and the intermediate segments are shorter.

48. Haplothrips graminis Hood.

The author's *Anthothrips floridenis* seems to be identical with this species and as Hood's description was published a few months earlier it takes precedence.

61. Hoplandrothrips quercuspumilae, n. sp.

Female. Total length 1.43 mm. General color dark brown with much red hypodermal pigmentation; all but segments 7 and 8 of the antennae clear brownish yellow; large yellowish brown areas on the inner sides of the distal ends of all femora; tarsi light brown.

Measurements: Head, length 0.24 mm.; breadth 0.21 mm.; prothorax, length 0.115 mm.; breadth 0.32 mm.; pterothorax, breadth 0.38 mm.;abdomen width 0.43 mm.; tube, length 0.145, breadth at base 0.07 mm.; at apex 0.038 mm. Antennae: segment 1, 37; 2, 45; 3, 66; 4, 62; 5, 56; 6, 53; 7, 44; 8, 28 microns. Total length 0.40 mm.

Head rounded in front, only a little longer than broad, cheeks slightly arched and converging posteriorly, provided with small warts which carry short spines. Postocular bristles rather short but stout and conspicuous, dilated into a small colorless head as are all the other prominent bristles except those on the tip of the tube. Eyes rather small, dark red. Antennae 1⅔ as long as the head. Segments 7 and 8 light brown; segment 4 thickest, bearing very few, pale, inconspicuous spines; sense cones rather long but very pale and inconspicuous.

Prothorax very short, less than half as long as the head; sides very rounding and bearing a thick, heavy spine. *Legs* moderately long, nearly concolorous with the body except the tarsi which are lighter. The light areas on the femora are largest and lightest on the hind femora where they occupy half of the length and two-thirds of the width of the femora. They are smaller on the middle femora. Fore femora but slightly enlarged. *Wings* moderately long, membrane colorless, not constricted in the middle, fringed with long hairs which are double for 7-9 hairs on the fore wings.

Abdomen short and thick, provided posteriorly with dark, capitate, conspicuous bristles. Tube rather small, bearing six bristles which are about as long as the tube and equal number of shorter ones.

Described from three females collected from "oak runner" (Quercus *pumuli*) near Gainesville, Fla., Aug. 7 and 8, 1919. Type in the author's collection. Paratype in the National Museum.

This thrips bears a superficial resemblance to H. flavo-antennis (Watson), but it is the apical segments of the antennae which are dark instead of the basal and the intermediate segments are not elongated.

KEY TO NORTH AMERICAN SPECIES OF HOPLANDROTHRIPS.

In the key to N. A. species of Phloeothrips (Florida Buggist, Vol 1, No 4, p. 75) those species in Section 1 now go into the genus Hoplandrothrips, as does also the author's Liothrips flavoantennis. The following additions to the key will serve to distinguish the species now placed in this genus.

aa. Segment 3 of antennae shorter than 1 and 2 together.

1. Antennae mostly brown or only the bases of 3-7 yellow.
   b. bb. and bbb. remain as before.
2. Antennal segments 3-6 light brownish yellow.—*H. quercuspumulae n. sp.*

aaa. Segment 3 about equal to 1 and 2 together, all segments yellow except 1 and base of 2. Antennae 1 two-thirds as long as head. *H. flavoantennis* (Watson)

Myrmecothrips gen. nov.

Head subglobose, well rounded in front and much contracted posteriorly, much larger than the prothorax, eyes small. Antennal segments, especially the intermediate ones, all much longer than wide. Mouth cone shorter than its breadth at the base, reaching more than half way across the prothorax. Legs long and slender; fore femora slightly thickened in the females, much enlarged in the males; fore tarsi with a short, blunt tooth in the females. A large long one in the males. Wings wanting. Abdomen short and thick.

Type Myrmecothrips querci n. sp.

This genus agrees with Uzell's description of Cephalothrips in all characters except the long legs. However, in all other described species of Cephalothrips the antennal segments are moniliform and it seems undesirable to stretch Uzell's description to cover a form so diverse in shape of head and antennae. Named from its resemblance to an ant.

62. **Myrmecothrips querci n. sp.**

Female. General color brown, abdomen black with large white spots on the outer edges of segments 1, 3 and 4. Head dark brown; prothorax a lighter brown, and metathorax lighter still with a yellow area on the posterior part; legs brown. Antennal segments 1 and 2 light yellow, others dark brown.

Measurements: Total body length 2.22 mm.; head, length 0.45 mm.; breadth 0.36 mm.; prothorax, length 0.31 mm., breadth 0.33.; mesothorax, breadth 0.29 mm.; abdomen, breadth 0.52 mm.; tube,length 0.19 mm.,breadth at base 0.09 mm., at apex 0.06 mm. Antennae: Segment 1, 52; 2, 62; 3, 148; 4, 119; 5, 96; 6, 90; 7, 52; 8, 46 microns; total 0.67 mm.

Head subglobose, only a little longer than wide, rounded in front; cheeks arched and strongly converging posteriorly to a neck whose diameter is only .6 that of the greatest diameter of the head, which is directly behind the post-ocular bristles; post-ocular bristles short (.05 mm.); a little longer bristle in front of each eye; both light brown and dilated at the tip into a large colorless head. Eyes small with a few facets.

Antennae 8-segmented; spines few and pale; sense cones short . Mouth cone reaching about .6 distance across prosternum.

Prothorax also subglobose; rounded posteriorly; with a deep constriction near the middle of each side; covering only the basal half of each coxa; each posterior angle and each coxa provided with a capitate bristle. *Legs* long and slender, nearly uniformly dark brown; fore femora considerably enlarged near the base, provided with a few knobbed bristles. Fore tibiae with an especially stout but rather short bristle on the inner side near the end. Fore tarsi with a short tooth; middle and hind tibiae with a row of about 8 stiff, pointed bristles along the inner side, the terminal one and another on the outer side longer than the tarsi.

Abdomen short and thick, abruptly rounded behind the seventh segment. On side of segment 1 there is an elongated, pearly white area, on segment 3 a similar small round one, and on segment 4 a larger round spot. The posterior segments bear modestly long, light brown sharp-pointed bristles. Tube short and thick with a terminal ring of 15 bristles, 8 of which are about as long as the tube.

Male similar to the female, but a little larger. Fore femora greatly enlarged and tarsal spines very long, stout, and curved.

Measurements: Total body length 2.46 mm.; head length 0.48., mm., breadth 0.32 mm.; prothorax, length 0.28 mm., breadth 0.38 mm.; mesothorax, breadth 0.29 mm.; abdomen, width 0.53.; tube, length 0.20 mm., width at base 0.09 mm., at apex 0.05 mm. Antennae: segment 1, 62; 2, 72; 3, 157; 4, 107; 5, 96; 6, 86; 7, 52; 8, 48 microns; total length 0.67 mm.

Described from six females and two males obtained by beating "oak runners" (Quercus pumula) near gainesville, Aug. 2. 11919.

Dolichothrips gen. nov.

Head nearly twice as long as wide and longer than the prothorax, subrectangular in outline, the anterior angles not rounded; sides nearly parallel, somewhat narrowed posteriorly. Mouth cone very short and blunt not reaching the middle of the prothorax. Legs rather short. Wings very short and feeble. Abdomen exceedingly long and slender.

Type Cephalothrips elongata Watson.

The species used as the type of this genus agrees in every particular with Uzell's description of Cephalothrips. But the other species of the genus have a short abdomen and the head is rounded in front. It now seems undesirable to include a form so diverse in shape of head and abdomen in that genus. Hind's figure of Cephalothrips yuccae does not show the head to be rounded in front but all specimens the author has seen show the character well.

The following key will separate the three genera.

Legs short. Head rounded in front. Anntennal segments all short.—*Cephalothrips.*

-Legs short. Head square in front. Antennal segments short.—*Dolichothrips.*

Legs long and slender. Head rounded in front. Interdemediate antennal segments elongated.—*Myrmecothrips.*

63. Chirothrips floridenis n. sp.

Female. General color uniformly light brown.

Measurements: Total body length 0.9 mm.; head, length 0.11 mm., breadth 0.11 mm.; prothorax, median dorsal length 0.12 mm., width including coxae 0.23 mm.; pterothorax, width 0.28 mm.; abdomen, width 0.27 mm.

Antennae:

Segment	1	2	3	4	5	6	7	8
Length	27	23	27	23	20	27	10	9 microns
Breadth	43	40	25	27	21	16	8	5 microns

Total length .155 mm.

Head about as long as its greatest width (behind the eyes), sides conspicuously swollen behind the eys and slightly so between the eyes and the bases of the antenae. Vertex depressed in front, the anterior ocellus situated on the margin of the depression and facing forward; no conspicuous bristles. *Eyes* rather large, occupying two-thirds the length of the head, slightly protuding, sparsely pilose, facets large . *Ocelli* large, posterior pair situated opposite and near the posterior margins of the eyes. *Mouth Cone* short, its length little more than half its width at the base, apex well rounded. *Antennae* but little longer than the head, basal segment rounded and very large, 1.6 times as wide as long, darker than the head. Segment 3 conspicuously pedicellate. Sense cones on segments 3 and 4 colorless but exceedingly thick and heavy; bristles short, pale, and inconspicuous.

Prothorax trapezoidal; sides straight and sharply diverging posteriorly, one moderately heavy spine at each posterior angle.

Pterothorax somewhat wider than the prothorax, sides bulging. *Wings* long and narrow, projecting beyond the tip of the abdomen; fore pair curved, light brown except for a clear area above the base, surface sparsely covered with very minute hairs; the anterior longitudinal vein bears three bristles, one near the middle and the others midway between it and the base and apex respectively; the posterior vein bears six small spines near the base; scale with a pair of heavy bristles near the apex, a smaller one near the base and three along the distal margin. Hind wings light gray. *Legs* short, fore femora enlarged, .7 as wide as long; all femora and tibiae brown, tarsi yellowish brown.

Abdomen short and thick, margins of segments almost black, producing distant transverse bands, bristles on the last two segments rather long.

Described from a single female taken by sweeping Bermuda grass at Seabreeze, Fla., Aug. 24, 1919, and several at Moor Haven June 1920. Type in the author's collection.

Male unknown.

In the shape of the head and thorax and in the presence of but one spine at each posterior angle of the prothorax, this species approaches nearest to C. mexicana; but in its wing characters it agrees with other species of the genus.

KEY TO NORTH AMERICAN SPECIES OF CHIROTHRIPS

1. A single median longitudinal vein in each fore wing. *C. mexicanus* Crawf.
2. Two longitudinal veins in each fore wing; fore wings brown.
   - a. Two stout spines at each posterior angle of prothorax.
     - b. Antennal segment 6 longer than 4 and 5 together. *C. insolitus* Hood.
     - bb. Segment 6 shorter than 4 and 5 together. *C. manicatus* Holiday.
   - aa. A single stout spine at each posterior angle. *C floridensis* n. sp.
   - aaa. Without stout spines at the posterior angles of prothorax.
     - b. Abdomen usually yellow.
       - c. Thorax yellowish brown.
         - d. Vertex with only two pairs of prominent bristles. Length about .8 mm. Prothorax 1.3 as long as the head. *C. obesus* Hinds.
         - dd. Vertex with 9 pairs of prominent bristles. Length about 1.1 mm. Prothorax 2.7 as long as head. *C. spiniceps* Hood.

cc. Thorax yellow ochre shaded with gray..........*C. vestis* Hood.
bb. Abdomen gray or yellowish brown ....*C. crassus* Hinds.

64. Haplothrips cassiae, n. sp.

Color uniformly brown with black hypodermal pigmentation; antennal segment 3 light brown and 4 little lighter than the remainder.

Measurements: Total body length 1.3 mm. (from 1 mm. to 1.5). Head, length 0.22, breadth 0.17 mm.; prothorax, length 0.13 mm., breadth, (including coxae) 0.26 mm.; mesothorax, breadth 0.28 mm.; abdomen, greatest width 0.34 mm.; tube, length 0.12, width at base .075, at apex .03 mm. Antennal segment 1, 30; 2, 53; 3, 59; 4, 61; 5, 48; 6, 44; 7, 41; 8, 27 microns.

Head about 1.3 times as long as wide, cheeks nearly straight but noticeably diverging posteriorly to the base of the mouth cone, roughened with minute warts and bristles. Vertex rounded, finely cross striated; no post-ocular nor other prominent bristles. *Eyes* rather small, occupying about one-third the length and a little over one-half the width of the head on the dorsal surface, slightly produced posteriorly on the ventral surface; dark reddish brown. *Ocelli* dark red; posterior pair situated opposite the anterior one-third of the eyes. *Mouth cone* very full and rounded at the base, then sharply contracted to a narrow point which however is rounded at the very apex; reaching about three-fourths the distance across the prosternum. *Antennae* about 1.6 times as long as the head; intermediate segments elongated; bearing very few conspicuous bristles; sense cones short but thick, colorless.

Prothorax little more than half as long as the head and twice as wide as long; the posterior angles rounded, bearing each a single heavy bristle with dilated tip.

Metathorax rectangular in outline; the middle of the dorsal surface bearing conspicuous longitudinal striations; destitute of prominent bristles. *Legs* moderately slender; concolorous with the body, even the tarsi being dark brown. Fore femora slightly enlarged, bearing on the lower surface an exceedingly long slender bristle. Fore tarsi with a very small inconspicuous tooth. *Wings* well developed; membrane reaching the base of the tube, clear except for a brown area at the extreme base, markedly constricted in the middle, fringed with long hairs, about 6 (5 to 7) interlocated ones.

Abdomen rather stout and short. Terminal segments bearing dark bristles of medium length. Tube short, wide at base but sharply tapering to the tip; sides straight; terminal bristles rather longer than the tube.

Described from five females collected from blossoms of Cassia at Seabreeze, Fla., Aug. 1919. Type in the author's collection. Paratypes in the National Museum and in the Museum of the University of Florida.

65. Haplothrips Funki, n. sp.

♀. General color light brown; head and thorax darker, tibiae, tarsi, and antennal segment 3 yellow.

Measurements: Total body length 1.87 mm. Head, length 0.187 mm., breadth 0.149 mm.; prothorax, length 0.187, breadth 0.307 mm; pterothorax, greatest width 0.32 mm.; abdomen, greatest width 0.357 mm.; tube length 0.12, width at base 0.067, at apex 0.029 mm. Antennal, total length 0.373 mm.; segment 1, 27; 2, 43; 3, 53; 4, 51; 5, 45; 6, 48; 7, 40; 8, 28 microns.

(Continued on page 27)

The

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MOSQUITOES

THE ENTOMOLOGIST is receiving many complimentary letters on the article by Dr. Hodge in the last number. The awakening interest in this most important matter of reducing the mosquito fauna of our state is indeed encouraging.

In this connection the Jacksonville Times-Union of Sept. 12 has an interesting article on the campaign now being waged to make the city of Perry an example and an object lesson for the other cities of the state.

Last month the editor spent an all too brief vacation in one of our beach resorts. We enjoyed the days hugely; the fish bit well and the surf was fine. But the nights! Well, it was necessary, soon after sunset, to beat an inglorious retreat to the shelter of our rooms and stay there. The half hour before retiring was dedicated to mosquito swatting and it was frequently necessary to repeat the operation between 12 N. and 2 A. M. How much more attractive would be our resorts would they but spend a few thousand dollars in cleaning up the local breeding places of mosquitoes.

At the "city limits" of many of our towns we see a sign "Welcome to Our City". It tickles our vanity to feel that the residents think enough of us to erect those signs. But, unfortunately, in many towns the *culicidae* extend an even more hearty welcome, including a reception committee of "prominent citizens" to meet us the second our car stops.

Now in all this we are not "knocking" Florida but endeavoring to do a little missionary work. If the mosquito were a necessary evil we would be like the "man convinced (by his wife) against his will", who was "of the same opinion still"—(mighty still). But the problem in most Florida towns is so simple and so cheap compared with the interests involved that we feel that it is the one largest opportunity for real service to the state now before us. The mosquito is the most powerful "knocker" we have. *Culicid delendus est.*

Many of our boards of trade etc. are spending hundreds or even thousands of dollars and much nerve energy in advertising their towns. How would it do to spend at least a part of that money in eradicating mosquitoes and let every delighted tourist and traveling man advertise our town gratis, especially if we are going to inaugurate a movement to open the tourist season on Oct. 1, the very date when mosquitoes are at their maximum abundance?

In the review of Applied Entomology (London, Eng.) Vol. VIII. Ser. B. Part 8, p. 141, occurs an abstract of a paper by E. Roubaud on the feeding habits of *Anopheles* in France The author states that the malaria mosquito much prefers the blood of cattle, horses and mules to that of man and that malaria is on the decrease in those regions where cattle are numerous. He thinks, however, that this is a recently acquired habit of the mosquitoes. Some observations along this line in Florida would be interesting. In any event there is no doubt but that if our farmers would keep their horses and mules in a tightly screened barn at night and install one of Hodge's traps in the windows, they could greatly reduce the numbers of mosquitoes about the premises; particularly if the house also was well screened.

THE TOILET OF THRIPS

There is at least one thing quite humanly feminine about a thrips. Her chief concern is for her hairs. When she has nothing else to do, and frequently when to our masculine minds she has many more important duties, she nevertheless elaborately brushes and smooths her hairs. There are some minor peculiarities of behavior necessitated by her anatomical plan. The more important hairs are on her wings instead of her head and she uses mostly her hind feet for a comb.

Invariably before she can start on a journey or drop in in her neighbor she must comb her hairs. Even in the face of grave danger, as the approach of the collector's needle, she cannot take flight until she has combed her hairs. Combed she must be even tho the delay proves fatal.

The camphor thrips especially spends a goodly part of her time in—combing her hairs. Even while she sucks the life sap of a camphor twig her hind legs are busy—combing her hairs. Having drunk her fill she retires to a shady, secluded nook and, resting on her four fore legs, doubles her hind ones over her back and—combs her hair. Watch her under a glass until your patience is exhausted—she continues to comb her hairs. Go back hours later—she is still combing her hairs. The wingless young show none of this concern for their hairs, but the first act of the adult is to comb her newly acquired wings. Collect one in a bottle and almost before you can insert the cork —she is combing her mussed hairs. If caught in a shower her first act after the rain has ceased is—to comb her hairs. Injure one mortally and with her last mite of strength she—*combs her hairs.*

PERSONALS

Several of our out of town members were in attendance upon the meeting of the County Agents in Gainesville during the week of September 6-11.

The work on the Camphor Thrips carried on by the U. S. Bur. of Ent. is now in charge of Mr. W. W. Yothers.

Mr. M. Marcellus Javens of Mt. Dora is suffering from an injury to his éye.

The county commissioners of Brevard and Polk Counties have recently given Mr. K. E. Bragdon and Wm. Gomme respectively very substantial evidence of their appreciation of their efforts as county agents.

Dr. E. W. Berger has returned from his annual visit in Ohio. Australian lady bird beetles please take notice.

Mr. A. C. Brown, Asst. Quarantine Inspector of the Plant Board at Miami, recently spent a few days at Gainesville.

Mr. W. L. Benedict has accepted a position with the Bureau of Plant Industry and has been assigned to citrus inspection work in California.

Mr. B. L. Boyden recently visited the Plant Board offices at Gainesville for conference regarding the sweet potato weevil eradication work.

Mr. Fritz Fuchs has recently disposed of his grove property in south Dade County and has removed to Miami.

Mr. B. F. Floyd, with the Wilson & Toomer Fertilizer Co., now has headquarters in Orlando with office in the San Juan Hotel.

Mr. J. C. Goodwin has taken a year's leave of absence from his duties as Chief Clerk for the State Plant Board and will pursue advanced studies during the year at the Iowa Agricultural College.

Mr. J. E. Graf has recently been investigating the bean ladybird beetle outbreak for the Bureau of Entomology in the vicinity of Birmingham, Ala.

Messrs. Wilmon Newell, J. H. Montgomery, Frank Stirling and C. E. Whittington attended the "black fly conference" at Orlando on September 9th.

Mr. Jas. Kerr, Asst. Nursery Inspector for the State Plant Board, is now in charge of the northern nursery inspection district, extending from Jacksonville to Pensacola.

Mr. Jas. F. Marsh is now in charge of the citrus grove inspection work in the vicinity of Ft. Myers, having succeeded Mr. Wm. L. Benedict.

Mr. and Mrs. C. A. Reese are the proud parents of a handsome baby daughter. Chas. "did the right thing" by the office force.

Mr. W. W. Yothers was among those attending the citrus growers conference at Orlando on September 9th.

Professor P. H. Rolfs, Director Florida Experiment Station, has recently visited Washington, D. C., on official business.

Dr. J. H. Montgomery represented the Plant Board at a Conference at Birmingham, Ala., of the Southern States Entomologists on September 20. This conference was called on account of the recent appearance of the Western Bean Ladybeetle (*Epilancha corrupta* Muls) in Alabama.

Mr. C. M. Hunt has built a house at Lake Wales. Mr. Hunt is now manager of a grove property at this place, having severed his connections with the Plant Board.

NEW THYSANOPTERA FROM FLORIDA—VII

(Continued from page 23)

Head longer than broad, cheeks slightly arched, roughened, slightly converging posteriorly. Post-ocular bristles thick but light colored, with a large transparent head. *Eyes* rather small, occupying about a third of the length of the head and a little more than half the breadth, deep red by reflected light. *Ocelli* large, concolorous with the eyes, situated far forward; posterior pair opposite the anterior third of the eyes and touching their margins. *Mouth cone* short and very bluntly rounded, scarcely reaching the middle of the prosternum, slightly swollen at the base. *Antennae* twice as long as the head. Segments 1 and 5-8 dark, concolorous with the head; 2 and 4 lighter brown; 3 yellow, clear at the apex. No sense cones on the inner surface of segment 3, those on 4, 5 and 6 thick but colorless. Bristles light colored and short.

Prothorax about as long as the head, sides conspicuously bulging across the coxae where they bear each a heavy, knobbed, but light-colored bristle; posterior angles much contracted, each bearing a similar bristle.

Pterothorax subrectangular, sides straight and nearly parallel. *Legs* rather long and slender. Femora dark brown, concolorous with the body. All tarsi and tibiae light brownish yellow, the latter shaded with brown on the outer surface. Fore femora considerably enlarged. Fore tarsi with a strong curved tooth and a smaller straight one. *Wings* well developed but not reaching the tip of the abdomen. Membrane clear in distal half but the proximal half of fore wing clouded with brownish gray. Fore wing much contracted in the middle, destitute of prominent veins or bristles; fringing hairs numerous and fairly long, 4 or 5 interlocated ones.

Abdomen rather long, sub-cylindrical, conspicuous bristles on only the last two segments but a few of these are quite long, light brown.

Described from two specimens; one obtained from sweeping vegetation including scrub oak at Daytona Beach Aug. 1919, and another from beating Basswood foliage Tilia americana at Gainesville, May 1920.

Male similar to the female but the fore femora more enlarged and the tarsal spine larger.

Described from a single specimen collected from underneath the bark of an oak tree (Quercus falcata) at Orlando Oct. 1919. Stated by Mr. Funk of the U. S. Drug Garden who called our attention to this insect, to have been abundant on the oaks in the spring.

66. Haplothrips querci, n. sp.

♀ General color grayish brown with a little red and purple hypodermal pigment. Fore femora and tarsi lighter.

Measurements: Total body length 1.17 mm.; head, length 0.19 mm.; width 0.17 mm.; prothorax, length 0.20, width including coxae 0.288; mesothorax, width 0.37 mm.; abdomen, width 0.24. mm. Antennae, segment, 1, 32; 2, 42; 3, 40; 4, 48; 5, 43; 6, 37; 7, 37; 8, 27 microns.

Head 1.1 times longer than broad, sides slightly bulging, parallel or slightly converging posteriorly, sparsely pilose, post-ocular bristle short and pointed, not reaching the middle of the eye. *Eyes* moderately large, occupying .4 the length and .7 the width of the head. Ocelli large, posterior pair set in front of the middle of the eyes and touching their margins. *Mouth cone* evenly and bluntly rounded, reaching a little past the middle of the prosternum. *Antennae* 1.5 times as long as the head; almost uniformly grayish brown, segment 2 a little darker and segment 3 a little lighter than the others; sense cones and bristles pale and inconspicuous.

Prothorax shorter than the head, nearly 1.5 times as wide as long, trapezoidal in outline; posterior angles well rounded and each bearing a pair of heavy but rather short, colorless bristles which are blunt at the end.

Pterothorax sub-rectangular in outline, sides converging slightly posteriorly. *Legs* moderately long; except the tarsi and fore tibiae which are lighter brown, concolourous with the body. Fore femora slightly enlarged. Fore tarsi with a small spine.

Wings well developed. Membrane clear except for a small area at the base and the scale of the fore wing which are clouded with brown. Fore wing noticeably contracted in the middle; fringing hairs long, 6 or 7 interlocated ones.

Abdomen quite short. The sides of each segment about parallel but abruptly contracted at the point of contact with the next. Bristles rather short, tube small, terminal bristles short.

Male similar but fore femora much enlarged and fore tarsal spine robust. Sides of the head converging posteriorly. Eyes larger.

Described from a single female and two males beaten from scrub oak at Daytona Beach, Fla., Aug. 1919. Type in the author's collection. Very close to H. Graminis but the color is less yellowish brown and the intermediate antennal segments are more elongated, especially the third. There is a sense cone on the inner surface of the segment 3 but it is thin and inconspicuous. The most noticeable difference is in the shape of the abdomen which is much shorter than in *H. graminis.*

67. Heliothrips fasciatus.

A single specimen of this species, which is very abundant in California where it is called the "Bean Thrips" because of its ravages on cultivated beans, was collected from Cassia at Seabreeze, Fla., Aug. 1919. This was far from any cultivated land and there can be no doubt that it is a native insect. This is the second report of its presence in the East, Mr. Morgan having collected it in Tenn.

68. Heterothrips tiliae, n. sp.

♀. General body color dark brown, intermediate antennal segments, tarsi, tips of all tibiae and entire fore tibiae brownish yellow.

Measurements: Total body length 0.75 mm. Head, length 0.07 mm.; breadth 0.13 mm.; prothorax, length 0.08, width 0.19 mm.; mesthorax, width 0.23 mm; abdomen greatest width 0.24 mm.; antennae, total length 0.19. Segment 1 (exposed portion) 9.5; 2, 28; 3, 48; 4, 38; 5, 29; 6, 26; 7, 11; 8, 12; 9, 10 microns.

Head about twice as wide as long, broadest behind the eyes; entire *dorsal surface conspicuously transversely striate;* cheeks bearing several short but stout hairs; frons deeply emarginate at the base of each antenna. *Eyes* black, prominent, projecting; *hairs between the facets* conspicuous, fully as large as those on the cheeks. *Ocelli* large, yellow, prominent. Posterior pair contiguous with the posterior inner angles of the eyes; flattened on the side next to the eye. Anterior facing forward. *Mouth cone* reaching nearly *across the prosternum. Antennae* almost three times as long as the exposed portion of the head; 9-segmented; segment 1 cup shaped, 2 and 6 barrel shaped, 3 urn shaped, 4, oblong, 5 ovoid, 8and 9 conical; 1, 2 and 6 to 9 dark brown, 3 to 5 brownish yellow; 3 nearly colorless at the base, 4 shaded with brown on apical half; 3 with two deep constrictions near the base and many shallow ones above. Bristles and sense cones short and very inconspicuous, nearly colorless except those on segment 2 which are larger and brown; segments closely united, articulations brown.

Prothorax considerably longer than the head, twice as wide as long, sides arched and strongly diverging posteriorly; dorsal surface transversely striated; two or three short, curved spines at each anterior angle; and a heavy, dark but short one at each posterior angle directed backward. *Legs* brown except the tarsi, *distal ends of the hind and mid tibiae and the entire fore tibiae* which are brownish yellow; surface marked with diagonal striations.

Mesothorax wider than either the prothorax or the metathorax; anterior portion of dorsal surface transversely striated, middle longitudinally striated. *Wings* considerably longer than the abdomen, membrane brown, covered with minute hairs, abruptly widened at the base, costal margin sparsely fringed with long hairs and bearing about 28 stout bristles, fore vein bearing about 14 and hind vein about 19.

Abdomen oval in outline, last segment markedly narrow and elongated, tubular. Bristles very short, those of the last two segments longer but still unusually short.

Male. Considerably smaller. Body length 0.50 mm. Head 0.047 mm. long and 0.14 mm. wide; prothorax, length 0.095 mm., breadth 0.18 mm.; mesothorax, greatest width 0.2 mm.; abdomen 0.14 mm. Antennae, segment 1, 10; 2, 28; 3, 50; 4, 36; 5, 30; 6, 27; 7, 12; 8, 14; 9. 11 microns.

Striations on the head and prothorax are less marked. Abdomen very small, scarcely twice as long as wide. Wings much exceeding the abdomen.

Described from a singe female and a single male collected from Basswood (*Tilia americanna*) at Gainesville, Fla., May.

This species is very close to *Heterothrips vitis* Hood but is smaller, lacks any suggestion of orange on the third antennal segment which is much shorter as is also the prothorax, and the forth antennal segment is also yellow. Type in the author's collection.

The
Florida Entomologist
(Formerly The Florida Buggist)
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VOL. IV WINTER NUMBER No. 3
JANUARY, 1921

NOTES ON SOME FLORIDA WEEVILS

A small collection of Rhyncophora recently identified for the Department of Entomology of the Experiment Station by Mr. W. S. Blatchley supplies two new records for Florida and some new data on distribution within the state, on dates of appearance, and food habits. Most of the systematic collecting in the state has been done during the winter so that summer records are rather valuable. The numbers in parenthesis are those in Blatchley's and Leng's "Rhyncophora of N. E. America."

(34) *Araeocerus fasciculatus* DeG. The Coffee-Bean Weevil. Taken from a frosted avocado tree near Tampa; and on the calyx of a Japanese persimmon from which the fruit had fallen, Gainesville, May. Probably not the cause of the dropping of the persimmon. This insect feeds on dried seeds and evidently also on diseased and dying tissue. It is a serious pest of coffee in some parts of the West Indies. It is said to have originated in India but is now apparently thoroly established in Florida.

(127) *Epicaerus formidulosus* Boh. This is a very common weevil and one of considerable economic importance. It is common on cotton plants and has been mistaken for the boll weevil by a great many farmers, in spite of its larger size and spotted color pattern. It is sometimes very destructive to young pepper plants, which it punctures at or a quarter inch below the surface of the ground. In Nov. 1919 it "ruined a field of peas" at Leesburg. In Bul. 67, U. S. Bur. Ent., it is said to injure young tobacco plants. We have taken it also on velvet beans, Ironweed *(Vernonia)*, yellow jasmine, goldenrod and several other compositae, and during every month from April to November. Evidently a quite general feeder. We have no winter records.

(153) *Tanymecus lacaena* Hbst. Captured in Gainesville, eating the leaves of *Baccharis.*

(177) *Eudiogogus rosenschoeldi* Fabr. was collected in October near Tampa by Mr. U. C. Zeluff, who writes: "On oak trees some of which were very heavily infested." This is the first record of this large handsome weevil from Florida. It also establishes a new host plant.

(217) *Hyperodes cryptops* Dietz. Gainesville, April 21. At "lizard's tail" *(Saururus cernuus)* in bloom. Said to be scarce.

(258) *Derelomus basalis* Lec. Said by Blatchley and Leng to be especially abundant on the dwarf papaw *(Asimina parviflora).* We have taken it at Gainesville on wild plum in Feb., on velvet beans in July, and on blossoms of the button-bush *(Cephalanthus).*

(411) *Tachypterus quadrigibbus* Say. The Apple Curculio. Branford, Fla., on cotton, a new host.

(434) *Anthonomus signatus* Say. This is the Strawberry Weevil which is quite a pest in some of the more northern states. It lays its eggs in the buds and then cuts the stem so that the bud withers and dies. It does not seem to attack strawberries in Florida but is abundant in the blossoms of the wild haw *(Crataegus)* in March.

(549) *Baris splendens* Casey. Reported only from thistle Feb.-April. We have taken it on thistle on Jan. 19, and on goldenrod, *Grindelia,* ironweed *(Vernonia)* and other composites, July-Sept. All records are from the heads of composites, evidently its preferred hosts.

(560) *Aulobaris ibis* Lec. On dog fennell and bee-balm *(Monarda),* abundant in October. But also from "mayweed" and ironweed on July 4. All previous Florida records are in the fall.

(575) *Centrinus modestus* Boh. On goldenrod in Sept.

(577) *Centrinus albotectus* Casey. Said to be "scarce" at Sanford in April but abundant here during April and May on goldenrod, flebane daisy, lizard's tail, blackberry and haw blossoms. Evidently a spring insect only with us, but reported in July in New Jersey.

(579) *Centrinus perscillus* Gyll. Schon. Campville, Fla., "Feeding on Cotton"; Sanford Aug. 3, 1918, on *Cassia* sp.

(584) *Odontocorynus scutellum-album* Say. Common at Gainesville, on various composites as are most other records. Evidently a weevil of compositae.

(586) *O. selebrosus* Casey. On cotton, a new host plant.

(671) *Auleutes cruralis* Lec. Taken in a damp meadow along Hog Town Creek near Gainesville. Apparently the first record from Florida.

(748) *Conotrachelus coronatus* Lec. Collected in the same locality as the last. Described from Enterprise, Fla., and heretofore known only from there and Vero.

(760) *Chalcodermus collaris* Horn. Taken from corn at Gainesville by H. L. Dozier Aug. 16, 1916, and on cotton at Branford, Fla., by Mr. J. F. L. Lindsey. Both of these are new hosts. This species looks like its near relative, the cowpea pod-weevil, but the surface of the thorax is covered with a network of ridges instead of sunken dots.

J. R. WATSON.

NEW THYSANOPTERA FROM FLORIDA—VIII

J. R. WATSON

(Continued from page 30)

KEY TO NORTH AMERICAN SPECIES OF HETEROTHRIPS

I. Antennae with ten segments..*H. decacornis* Crawford.

II. Antennae with nine segments.

a. Without circles of distal sensoria on antennal segment 4. *H. salicis* Shull.

aa. Segment 4 of antennae with distal circles of sensoria.

b. At least part of the abdominal tergites bordered with scales with fringed margins.

c. Abdomen not pubescent.

d. Prothorax twice as long as the head. U. S. *H. arisaemae* Hood.

dd. Prothorax not twice as long as head. W. I. *H. borinquen* Hood.

cc. Abdomen more or less pubescent.

d. Abdomen sparsely pubescent.

e. Whole antennae more or less yellow. Panama. *H. flavicornis* Hood.

ee. Only segment 3 always yellow............*H. lyoniae* Hood.

dd. Abdomen more densely pubescent.

e. Prothorax sculptured with anastomoxing lines. Western...*H. pectinifer* Hood.

ee. Prothorax free of sculpture except for a few lines. (*H. azaliae* Hood) *H. aesculi* Watson.

bb. Abdominal tergites fringed posteriorly with hairs which are not at all coalesced into scales. Abdomen closely pubescent.

c. Third antennal segment 3.6 times as long as wide. *H. analis* Hood.

cc. Antennal segment 3 less than 3 times as long as wide.

d. Length 1.00 mm.; antennal segment 3 61 microns long, orange tinted .... *H. vitis* Hood.

dd. Length .75 mm.; antennal segment 3 48 microns long, no orange .... *H. tiliae* n. sp.

69. Euthrips grandioculus, n. sp.

Color almost uniformly brown; tibiae and tarsi lighter brown; posterior segments of the abdomen darker.

Average measurements: Total body length 1.32 mm. Head, length .122, width .133 mm.; prothorax, length .13, width .145 mm.; mesothorax, width .20 mm.; metathorax, width .17 mm.; abdomen, width .20 mm. Antennae, total length .20 mm.

Segment	1	2	3	4	5	6	7	8	9
Length	21	31	39	37	34	33	11	8	12 microns
Width	28	24	17	17	16	17	11	5	4 microns

Head wider than long, rounded in front, cheeks slightly arched, dorsal surface coursely reticulated posteriorly, spines short and inconspicuous. *Eyes* large, protruding, occupying half the length of the head and two thirds the width. *Ocelli* sub-approximate, large, bordered with deep orange crescents. *Mouth-cone* long, reaching nearly across the prosternum, rather blunt at the very tip which is nearly black. Antennae about 1.6 times as long as the head, apparently 9-segmented thru an oblique division of segment 6; Segments 1 and 2 concolorous with the head, 3-5 brownish yellow, 6-9 lighter brown; sense cones rather thick and long but colorless and decidedly inconspicuous.

Prothorax quite square in outline, but little wider than the head and nearly as long as wide. No prominent spines. Mesothorax wider than the prothorax; fore angles rounded; sides quite strongly arched. Metathorax considerably narrower than the mesothorax; sides nearly straight and parallel. Legs rather short. Stout spines on the inner side of hind tibiae. Black spot at tip of tarsi less conspicuous than in *E. obscurus*. *Wings* rather short, membranes of the fore pair brown; veins quite prominent, each one bearing 8 stout bristles. Hind wings nearly clear.

Abdomen quite long, cylindrical. Conspicuous bristles on the last two segments only.

Described from five females collected from grass at Moore Haven, Fla., June 13, 1920.

Very close to *Euthrips obscurus* [*Anaphothrips striatus* (Osborn)] but differs in its darker color, protruding eyes, longer mouth cone, prothorax longer and more nearly square in outline (i. e. less rounded at the angles), shorter legs, mesothorax with less obtusely rounded fore angles, metathorax not smoothly joined to the mesothorax.

70. Eurythrips longilabris, n. sp.

Female. Measurements: Total body length 1.14 mm.; head, length 0.13 mm., width 0.14 mm.; prothorax, length 0.13, width across coxae 0.24;

mesothorax, width 0.24; metathorax, greatest width 0.27; abdomen, greatest width 0.24 mm. Antennae, total length 0.34 mm.

Segment	1	2	3	4	5	6	7	8
Length	35	42	58	57	52	38	28	28 microns
Width	33	28.5	28	27	27	27	21	14 microns

General color light, yellowish brown; head, antennae, and tube darker, a dark tan color, body under reflected light shows much bright yellow hypodermal pigmentation.

Head about as long as wide, narrowed in front, vertex elevated and projecting forward between the bases of the antennae. Cheeks bulging abruptly behind the eyes, elsewhere nearly straight, diverging slightly posteriorly, roughened by small wart-like swellings which bear short bristles.

Eyes small, occupying a little over a third of the length and two fifths of the width of the head. *Ocelli* yellowish brown, very large but inconspicuous, anterior one situated far forward between the bases of the antennae, facing forward; posterior pair widely separated, situated opposite the anterior part of the eyes but far removed from their margins. Postocular bristles long and sharp pointed, projecting far beyond the eyes. Two pairs of smaller bristles situated posterior to them and a somewhat larger pair mediad. Two small ones behind and one in front of each ocellus. *Mouth cone* long and slender, sharp-pointed at the tip, reaching quite across the prosternum. *Antennae* 2.5 times as long as the head. Segments large and heavy; 1 and 3 about concolorous with the head; 2 lighter, brownish yellow; the others darker brown than the head; bristles and sense cones long and thick but pale.

Prothorax trapezoidal, about as long as the head; widening sharply posteriorly; posterior angles broadly rounded; a long acute spine on each angle, subequal in length; and one about the middle of each side.

Mesothorax about as wide as prothorax, a slight constriction in the middle; closely united to the metathorax whose sides are straight and parallel. *Legs* of medium length, fore femora slightly enlarged; fore tarsi with a small, sharp spine. *Wings* short, membrane brown, fringed with long but comparatively few hairs.

Abdomen rather short but longer than in some of the species of the genus, sides nearly parallel to the 8th segment and then abruptly rounded; lateral bristles rather short, pale. Tube very short; terminal bristles scarcely as long as the tube.

Male unknown.

Described from a single female taken about a light at night. August, 1920, Gainesville. Type in the author's collection.

This species agrees with *E. hindsi* Morgan in the roughened antennal segments, acute spines, and narrower body, but differs in color, long mouth parts, presence of wings and ocelli, and numerous minor characters.

KEY TO THE SPECIES OF EURYTHRIPS

a. Mouth cone short and blunt; spines of the body blunt.

b. Width of the abdomen about 1.7 that of the prothorax; antennae twice as long as the head.................................*E. ampliventris* Hinds.

bb. Abdomen about 1.25 times as wide as prothorax; antennae about 2.5 times as long as the head.......... *E. osborni* Hinds.

aa. Mouth cone sharp-pointed at the tip; spines of the body acute.

b. Mouth cone reaching only middle of prosternum..... *E. hindsi* Morgan.

bb. Mouth cone reaching across the prosternum....... *E. longilabris*, n. sp.

KEY TO N. A. SPECIES OF HAPLOTHRIPS

I. Post-ocular spines small or wanting. Antennae almost uniformly brown except segment 3 and base of 4 which are light brown.

a. Brown, with reddish, hypodermal pigment. Wing membrane brown for half its length. Tarsal spine large.......... *H. statices* Haliday.

aa. Brown with black hypodermal pigment. Wing membrane brown at extreme base only. Tarsal spine inconspicuous. *H. cassiae* Watson.

II. Post-ocular bristles well developed.

a. Post-ocular bristles and most of those of the thorax knobbed.

b. Sides of the head set with minute bristles, surface roughened; fore tarsi with a large tooth; 10 to 12 accessory hairs on the fore wings.......... *H. flavipes* Jones.

bb. Sides of head with few inconspicuous bristles.

c. Eyes produced posteriorly on the ventral side. Wings normal length.

d. Head faintly sculptured; no interlocated hairs on fore wings; tibiae brown.......... *H. bellus* Hood and William.

dd. 3 or 4 interlocated hairs; head almost free of sculpture; tibiae pale yellow.......... *H. tibialis* Hood.

cc. Eyes not produced posteriorly.

d. No interlocated hairs; wings only half the length of the abdomen.......... *H. gracilis* Watson.

dd. 4 to 7 interlocated hairs; wings normal length.

e. Post-ocular bristles short.......... *H. Dozieri* Wats.

ee. Post-ocular bristles long.

f. Head wider posteriorly; tibiae brown.

g. Head about as long as wide; sides of prothorax bulging.......... *H. gowdeyi* Franklin.

gg. Head longer than wide; sides of prothorax concave. *H. merrilli* Watson (20-b)

ff. Head narrower posteriorly; tibiae yellow. *H. funki* Watson.

aa. Post-ocular bristles not knobbed.

b. Apex of femora with small anteriorly directed tooth within.

c. Antennae uniformly dark brown; terminal bristles shorter than the tube.......... *H. jonesi* Karny (*H. nigricornis* Jones).

cc. Antennal segment 3 brownish yellow; terminal bristles longer than the tube.......... *H. haplophilus* Hood.

bb. Apex of femora toothless.

c. Wings clear except a brownish area at base.

d. Antennae twice as long as head, usual sense cones present on segment 3.

e. Bristles of the anterior and posterior margins of prothorax about equal.

f. Antennal segments 3-6 bright yellow; abdominal spines (except those of the tube) slender and faint; prothorax about 1.5 times as wide as long.
H. verbasci (Osborn)

ff. Antennal segments 3-6 light brown or yellow; abdominal spines stout and conspicuous; prothorax about twice as wide as long.........*H. variabilis* (Crawford).

ee. Bristles of the anterior margin of the prothorax much shorter.

f. No interlocated hairs on wing.........*H. malifloris* Hood.

ff. About 20 interlocated hairs.
H. orlando Watson and Osborn.

dd. Antennae less than twice the length of the head.

e. No sense cones on the inner surface of segment 3.

f. Prothorax less than twice as wide as long.

g. Only antennal segment 3 entirely yellow or brownish yellow.

h. Antennal segment 3 shorter than 2.
H. graminis Hood.

hh. Antennal segment 3 longer than 2.
H. pini (Watson) (Cryptothrips pini Wats.)

ff. Prothorax nearly or quite twice as wide as long.

g. Antennal segments 3-6 yellow, 3 longer than 2.
H. faurei Hood.

gg. Only antennal segment 3 yellow, shorter than 2.
H. humilis Hood.

ee. Sense cones present on segment 3...............*H. querci* Wats.

cc. Wings clouded with gray with a nearly black area at the base and a paler one just before the middle, 2 interlocated hairs.
H. nubilipennis Hood.

CALLING US NAMES

In a recent advertising circular the Country Gentleman lists among its writers a former "*entymologist* of Texas State Univ."

HAS HE CROSSED THEM WITH WATER HYACINTHS?

A correspondent writes: "I have thirty acres of onions on Lake Okeechobee."

The

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PROFESSOR J. R. WATSON .... *Editor*
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DR. E. W. BERGER .... *Business Manager*

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A FOOD PLANT OF LANGURIA DISCOIDEA Lec.

The beetles of the family *Erotylidae* are known as "The Pleasing Fungus Beetles." They are mostly slender, in shape resembling the click beetles but usually taper conspicuously toward the posterior end and, instead of the sober uniform colors of those beetles, these are most prettily and tastefully colored in striking patterns of red and black, a red thorax and black elatra or the reverse. Striking, but trim and elegant, never with gaudy or harlequin color patterns, they are indeed "pleasing" to the eye, quite "chic" in fact. It would seem that they should be an ornament to any sago palm; but at least one nurseryman cannot see it that way.

The family is well represented in the tropics and numbers 1800 species but only 50 of them are found in North America. Most of these beetles live in fleshy fungi into which they bore but those of the genus *Languria* feed on plants and are often found visiting flowers. Tho one species, *L. mozardi,* is known as the Clover-Stem Borer, from its habit of boring into the stems of clover to which it is sometimes very destructive, their habits, especially those of the larvae, are not well known, generally speaking. This seems to be true of *L. discoidea* Lec., so the following observation by Mr. John Beach, the well-known nurseryman of West Palm Beach, is a real contribution to our knowledge of the species:

"It lives on the sago palms and eats the young shoots. It also nips the old leaves to some extent, and when the plant is touched drops into the bud. I have known them for twenty years on the sagos and have seen them ruin a fine lot of sagos at the Craigin place but it took them four years to do it. After covering all the sagos they attacked and killed the buds of *Washingtonias,* *Arecas, Kentias, Phoenix,* and *Pandanus.* I killed them by dusting powdered pyrethrum into the buds."

It would be interesting to know if the larvae also feed on the palms.

REPORTS OF MEETINGS OF THE FLORIDA ENTOMOLOGICAL SOCIETY

Sept. 27, 1920. The Society met in Language Hall at 4:30, President Merrill in the chair. The following members were present: Merrill, Chaffin, Stirling, Davis, Reese, Fattig, Watson, Berger, Stone, Montgomery.

Letters were read from U. C. Loftin, Tucson, Ariz., and H. B. Loding, Mobile, Ala. Mr. Loding suggested the use of a weak solution of cyanide in the Loftin mosquito traps. In the discussion which followed the consensus of opinion was that such a procedure would be dangerous for general use.

The paper of the evening on "Diseases of Bees" was given by C. A. Reese. He gave a brief but comprehensive statement of the diseases of honey bees and their treatment. (This information will appear in *The Florida Grower.*)

Under the heading of Brief and Timely Notes, Mr. Stirling called attention to the meeting of the state beekeepers which would be held in Gainesville on Oct. 6. Professor Watson presented a chart showing the relation of the winter weather to the abundance of the Velvet Bean Caterpillar the following season. It appears that very severe frosts cause the extermination of the insects and results in smaller numbers and later arrival the following season. The milder frosts during the past two years have resulted in an increasing amount of injury.

Mrs. S. F. Richmond of Loughman, Fla., and Miss Stella Brodnax of Jacksonville were elected to membership in the Society.

Oct. 25, 1920. The Society met in Language Hall at 4:30. Mr. H. P. Loding, proprietor of The Gem Floral Garden, Mobile, Ala., and Professor R. W. Harned, Agric. Coll., Miss., were elected members.

The paper of the evening was given by Dr. Montgomery on the Mexican Bean Beetle which has recently obtained a foothold in Alabama. The speaker called attention to the severe damage inflicted by this insect on beans and cowpeas and the freedom of velvet beans from attack, and the danger of its ultimately reaching Florida. In the discussion that followed Professor Watson stressed the point that the name "bean" as applied to the velvet bean was more or less of a misnomer, that the plant was not very closely related to the true beans and that there are comparatively few insect pests common to the two, so that it is not surprising that the Mexican Bean Beetle does not attack velvet beans. A motion was passed that a committee of three, of whom the Secretary be one, be appointed to prepare resolutions pointing out the danger to Florida from this beetle and urging that growers refrain from securing forage from the infested region.

Under Brief and Timely Notes, Professor Watson read a letter from a physician at Hawthorn, Fla., reporting on two cases of poisoning by the bite of the "Black Widow" spider. Both showed extreme symptoms of nervous and gastric disturbances. The latter were so pronounced that when one of the patients was rushed to a hospital in Jacksonville he was at once operated on for appendicitis.

J. H. MONTGOMERY, Sec'y.

Nov. 29, 1920. The Society met in Language Hall at 4:30 p. m. with President Merrill in the chair. Dr. O. F. Burger, the new Plant Pathologist at the Experiment Station, was elected to membership. A letter from the President of the Am. Ass. Econ. Ent. addressed to President Merrill requesting that a representative of the Society be appointed to attend the Chicago meeting of the Association in December was read. The President appointed Mr. F. M. O'Byrne as our representative at the above meeting.

The subject of the evening's program was "A Discussion of Dr. Pierce's Lectures on Entomology" which was led by Dr. E. W. Berger.

Under Brief and Timely Notes Prof. Watson spoke of the introduction of a mite from Canada which was parasitic on the Oyster-shell Scale and the advisability of determining if this mite would work on the closely related Purple Scale. On account of the small number of members who would be in Gainesville during the last week of December it was decided to have no meeting at that time.

FRANK STIRLING, Secretary pro tem.

RECENT PUBLICATIONS OF INTEREST TO FLORIDA ENTOMOLOGISTS

"Fumigation of Citrus Plants with Hydrocyanic Acid: Conditions Influencing Injury" by R. S. Woglum. U. S. D. A. Bul. 907.

"The Black Fly of Citrus and Other Subtropical Plants" Dietz and Zetek. U. S. D. A. Bul. 885.

"Cotton Boll Weevil Control by the Use of Poison," B. R. Coad. U. S. D. A. Bul. 875.

"Results of Experiments with Substances Against Chicken Lice and the Dog Flea," W. S. Abbott. U. S. D. A. Bul. 888. The author recommends good, fresh pyrethrum powder for both pests and sodium fluorid and mercurial ointment for chicken lice.

"The Beet Leaf-Beetle" *(Monoxia puncticollis* Say), Chittenden and Marsh. U. S. D. A. Bul. 892. Florida is included in the range of this beetle but it does little damage here.

"The Pear Borer" *(Aegeria pyri* Harris), F. E. Brooks. U. S. D. A. Bul. 887. Evidently the author did not consult Grossbeck's List of the Lepidoptera of Florida in outlining the insect's distribution as he omits Florida from the list.

Farmers' Bulletin 1148 on "Cowpea Culture and Varieties" has a section on the "Insect Enemies of the Cowpea," "prepared with the advice and cooperation of E. A. Back." This deals mostly with the seed weevils. The most troublesome of all the insect enemies of cowpeas in our section and the limiting factor in their cultivation for seed production, the Pod Weevil *(Chalcodermus aeneus)* is not even mentioned.

Farmers' Bul. 1102, "The Crow in its Relation to Agriculture." The author's conclusion is: "The influence of the race as a whole for good and harm appears to be about equal." This has reference to the "common crow" of most of the U. S. The most common crow in at least the central part of Florida is not this species but the Fish Crow. This does not seem to trouble sprouting corn or chickens to any extent.

Farmers' Bul. 1122 is on "Citrus Fruit Growing in the Gulf States" by E. D. Vosbury. It contains the spray schedule.

"Orthoptera of N. E. America" by W. S. Blatchley (Nature Publishing Co., Indianapolis, Ind.) is the last word on this group of insects. It is a large and complete book of 784 pages, with very full descriptions and notes on habits, distribution, food and life history of all our species. It contains about 250 illustrations. It is invaluable to students of this order of insects.

PERSONALS

Dean P. H. Rolfs, for the past 15 years Director of the Florida Agricultural Experiment Station and a charter member of our Society, has been granted a four years' leave of absence to found and conduct an agricultural institution in the state of Minas Geraes, Brazil. He sails from New York on Jan. 19. At a special convocation on December 22 the University conferred the degree of Doctor of Science on Dean Rolfs.

Professor Herbert Osborn of Ohio State University is expected in Gainesville about Jan. 15. He will spend several weeks in the state collecting jassids.

Mr. W. S. Blatchley has arrived at his winter home in Dunedin. He is planning a two weeks' collecting trip to Paradise Key and extreme southern Florida some time in February.

Mr. A. H. Beyer, who is now engaged in the Corn Borer Laboratory of the U. S. Bur. of Ent. at Arlington, Mass., is spending a ten days' vacation with his father at Lakeland.

According to the Jour. of Econ. Ent., John B. Gill, who has been in charge of the Pecan Insects investigations for the U. S. Bur. of Ent. at Monticello, Fla., has been transferred to Brownwood, Texas.

Plant Commissioner Newell, Dr. Montgomery, F. M. O'Byrne, and Frank Stirling are in attendance upon the meetings of the Amer. Ass. of Economic Entomologists at Chicago.

Miss Evelyn Osborn is now Professor of Entomology in the Agricultural College of Syracuse University.

Mr. H. L. Dozier, formerly Assistant in the Department of Entomology of the Experiment Station and now with the Miss. State Plant Board, stopped over in Gainesville recently.

Announcements are out of the marriage of Mr. U. C. Loftin to Miss Mae M. Lebeuf of New Orleans. At home after Jan. 15th, at Tlahualilo, Durango, Mexico.

Dr. Wilmon Newell, Plant Commissioner, and retiring President of the American Association of Economic Entomologists, was elected to the Committee on Policy of the Association at its Chicago meeting, December 29-31, 1920. The Committee subsequently selected Dr. Newell as its Chairman.

Messrs. C. H. Popenoe and J. E. Graf, in charge of the sweet potato weevil eradication work in the South, are expected at Gainesville about February first, and will make a tour of the State in connection with this work.

Dr. W. A. Orton, member of the Federal Horticultural Board, Washington, D. C., will make a trip to Florida in January for the purpose of inspecting the various lines of work conducted under the auspices of the Federal Horticultural Board. Dr. Orton will pay special attention to the port quarantine work being carried on by the State Plant Board in collaboration with the Federal Horticultural Board.

Dr. Newell, Dr. Montgomery, Messrs. O'Byrne and Warner were in attendance at the hearing in Washington, D. C., before the Horticultural Board on December 20th, to consider the imposition of a quarantine or regulative measures intended to prevent the introduction of the Black-Fly into this country and particularly Florida. The Board will announce its decision in January. It is confidently expected that proper safeguards will be provided.

In December, Mr. L. R. Warner, Assistant Quarantine Inspector for the Plant Board at Key West, Fla., visited Cuba and the Bahamas collecting information on the Black-Fly.

Mr. George B. Merrill, Assistant Entomologist of the State Plant Board, Gainesville, Fla., has been advanced from the grade of Associate Member to that of Active Member in the American Association of Economic Entomologists. The honor was conferred upon Mr. Merrill in recognition of his work.

THE HABIT OF HORSE FLIES CHASING AUTOMOBILES

In the Review of Applied Entomology, VIII-B-6, p. 110, occurs a review of "A Contribution to Knowledge of the Tabanidae of Palestine", by Maj. E. E. Austin, in which occurs this statement; "Attention is directed to the pursuit of a fast traveling motor car by two species. This habit does not seem to have been previously recorded, though in Africa the attraction for Glossina of moving vehicles or animals has been noticed on more than one occasion." The phenomenon of Tabanids pursuing automobiles is often noticed here in Florida. Doubtless it is a manifestation of the primitive instinct of the chase common to those predaceous animals that pursue their prey. The Business Manager also states that, some years ago, he captured at one time, several dozen Tabanids trapt back of an open door at the rear of a coach, on a north-bound Florida East Coast Railway train that he boarded at Titusville, Fla. Had these flies mistaken the railway train for a big animal?

DR. NEWELL DEAN OF AGRICULTURE

As we go to press the announcement is made that the Board of Control at their last meeting placed Dr. Wilmon Newell in charge of the Agricultural College, Experiment Station and Agricultural Extension as well as the Plant Board. This places all of the agricultural activities on the campus under one head, thus ensuring perfect cooperation between the different departments.

Mr. A. H. Beyer has resigned from the Bureau of U. S. Entomology to take up the work of assistant in the Departments of Plant Pathology and Entomology in the Experiment Station.

A JAPANESE ORANGE FRUIT FLY

In a Bulletin of Imperial Agric. Central Experiment Station T. Miyake describes a serious orange fruit fly, thus reminding us of one of Florida's advantages. Florida, California and some of the West Indies are the only citrus sections on earth which have no fruit flies—no worms in their oranges.

The

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NOTES ON SOME AMERICAN TINGIDAE, WITH DESCRIPTIONS OF NEW SPECIES*

By Carl J. Drake

Leptoypha mcateei n. sp.

Form oblong, the elytra distinctly constricted a little beyond the middle. Antennae more slender and a little longer than in *L. binotata* Champion; first segment slightly longer than the second, the latter obconical; third segment a little more than three and a half times the length of the fourth, the fourth slightly longer than the first and second conjoined. Elytra extending a little beyond the tip of the abdomen; costal area extremely narrow, with a single row of tiny areolae; subcostal area with three to four rows of areolae, the areolae very slightly smaller than those of discoidal area; sutural area broad, the areolae becoming larger towards the apex. Median pronotal carina quite distinct, the lateral ones traceable on the posterior extension. Spines on vertex of head short, decumbent, converging at the apex; lateral spines rather long, decumbent, extending a little beyond the posterior margins of the eyes. Pronotum coarsely punctured. Length, 2.89 mm.; width 1.14 mm.

General color light reddish brown, with fuscous markings. A transverse spot on each side behind the collar, one on each side near the lateral carinae, discoidal area and a broad transverse band about the middle of costal area, and part of the veinlets of sutural area dark fuscous. Antennae and legs reddish brown. Bucculae, rostral sulcus and spines on head yellowish brown.

Two specimens, taken on wild olive, *Osmanthus americanus*, August 13, 1916, Gainesville, Fla. Numerous nymphs and adults were observed feeding on the underside of the leaves by Mr.

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*Contribution from the Department of Entomology, the New York State College of Forestry, Syracuse, N. Y.

Dozier. I am indebted to Dr. Champion for comparing the *type* of this insect with the *type* of *L. binotata* Champ. in the British Museum. The species is named in honor of Mr. W. L. McAtee, who has taken a very active interest in the genus. *Types* in my collection.

Corythaica smithi n. sp. (Plate I; Figs. *a* and *a'*).

Allied to *C. monancha* Stal., but very distinct and readily separated from it by the rounded lateral margins of the paranota, the more evenly arched median carina, and the more deflected hood in front. Length, 3.1 mm.; width 1.4 mm.

Pronotum coarsely punctate, with distinct cells on the posterior projection. Paranota broad, quite evenly rounded, with mostly three (some places four) rows of areolae. Median carina strongly raised, about equal to crest of hood in height, quite evenly rounded above, with two rows of areolae at middle. Lateral carinae uniseriate, the areolae large, slightly constricted at the middle. Hood a little larger and projecting a little farther in front of the head than in *C. monancha*, quite evenly narrowed in front, the median nervure distinctly raised, four rows of areolae at base (for three cells) and then with two roof-like rows extending anteriorly. Wings a little longer than abdomen. Elytra extending considerably beyond the apex of the abdomen, slightly constricted a little beyond the middle; tumid elevation moderately large and occupying greater part of subcostal and discoidal areas; costal area with two rows of large areolae (three or four additional small cells on each side); subcostal area wide with five rows of areolae, the areolae becoming distinctly smaller towards the costal area. Discoidal area bounded by a strongly raised nervure, four rows of areolae at widest part, the tumid elevation occupying the great part, all save inner row of cells, of this area. Sutural area broad, the areolae becoming larger posteriorly. Areolae translucent. Antennae slender. Rostrum reaching to meso-metathoracic suture.

General color yellowish brown, with fuscous markings. Hood with the nervures above pale brown, the cells whitish and opaque. A spot on median carina and one on each paranota fuscous. Costal area with broad cross band a little in front of the middle, one or two spots between the band and dark apical portion, part of discoidal area, sutural area and most of apical portion of elytra fuscous. Body dark reddish brown beneath. Antennae and legs light brown, the apical segment of the former dusky.

Two specimens, male and female, from Bonda, a village on Manzanares river, seven miles east of Santa Marta, Colombia, S. A., collected by H. H. Smith, after whom the insect is named. *Type* in Carnegie Museum. This species may be separated at once from any of the known species with rounded margins of paranota, by its much wider paranota. The female is a little larger than the male. The male is figured.

Corythucha mcelfreshi n. sp. (Plate I; Figs. *b* and *b'*).

Somewhat allied to *C. unifasciata* Champion, but very distinct and readily separated from it by its much smaller size, the broader bulbous portion of the hood, the differently formed carinae, and the elytra are without distinct fasciae. Length 3.54 mm.; width, 2.3 mm.

Lateral margins of elytra and paranota with numerous short spines, some places with double rows (extra submarginal row). Nervures with very few erect spines. Tumid elevation of elytra moderately large, costal area triseriate. Paranota with areolae smaller than those of hood. Hood moderately elevated, broad, abruptly constricted a little in front of the middle; posterior portion large, broad, sub-globose (a little longer than broad and broader than high); median carina slightly arched, shorter and about half as high as crest of hood. Lateral carinae not widely separated from hood, with four moderately large cells, raised anteriorly. Height of hood about three-fifths of its length.

General color yellowish white. A few nervelets on the paranota, a spot on each tumid elevation, and a few cross-nervures (perhaps indicating transverse fasciae on elytra) brown. Areolae hyaline, the areolae of tumid elevation partly embrowned. Body black.

One example from Mexico in the late Frank M. McElfresh collection. The species is so very distinct that I feel safe in describing the insect from a single specimen. *Type* in my collection.

Corythucha morrilli Osborn and Drake.

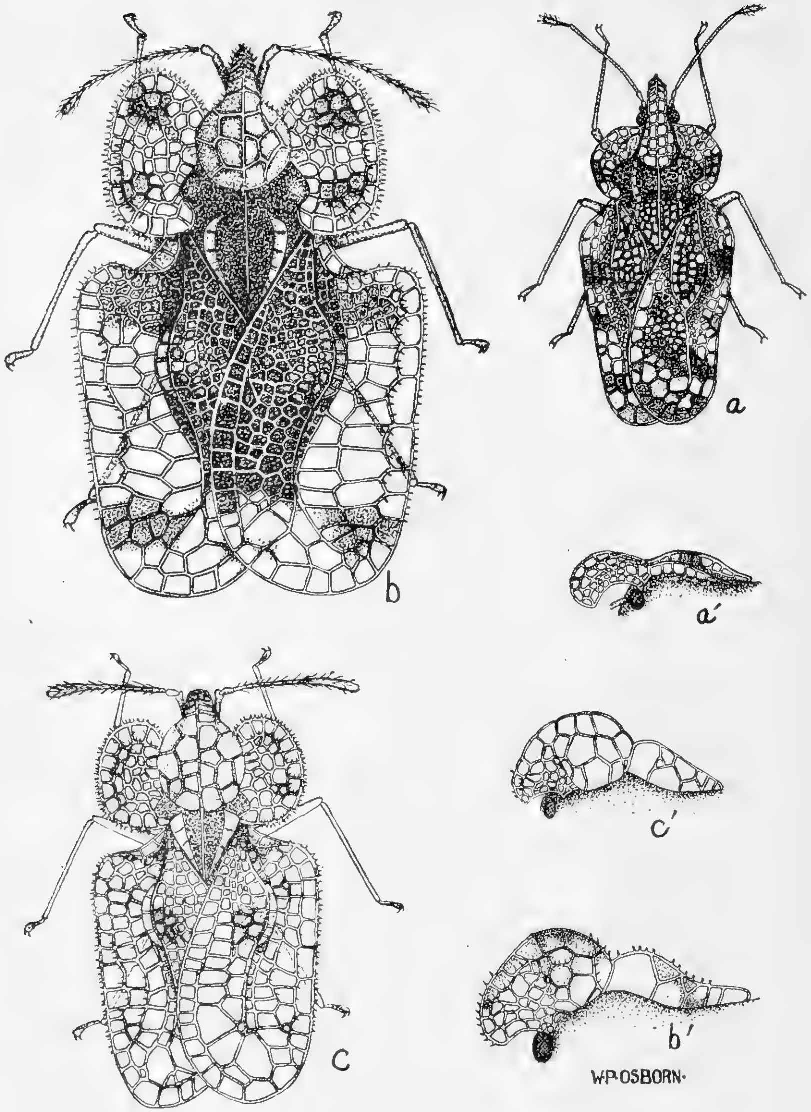
Numerous specimens, including *type*, *paratypes*, and many other specimens fully convince me that it is impossible to separate this insect from *paratypes* of *C. mexicana* Gibson. *Morrilli* O. & D. is somewhat variable in size and color; the hood also shows some variation in size and height. In this respect it is much like its congener, *C. marmorata* Uhler. *Morrilli* is a common species in Texas, Arizona, New Mexico, California and Mexico. It feeds and breeds commonly on sunflowers, *Helianthus* spp. Other specimens at hand bear the food plant labels ebony, beans, and desert plant.

Corythucha contracta Osborn and Drake.

This is a common insect in Ohio, Indiana and Illinois. I have numerous specimens from Jefferson (collected by Sim), Columbus, Delaware, Malta and Rockbridge, Ohio. It is also found throughout the eastern and northeastern part of the United States. *C. parshleyi* Gibson is identical and a synonym of *contracta* O. & D. It has been found feeding and breeding on basswood, walnut, butternut and pecan.

Corythucha seguyi n. sp. (Plate I; Figs. *c* and *c'*).

Closely allied to *C. unifasciata* Champion, but distinguished from it by its larger size, the elytra broader apically, and the



EXPLANATION OF PLATE

Drawn by MR. W. P. OSBORN.

PLATE I. Fig. *a*, *Corythacia smithi* n. sp.

Fig. *a′*, Side view of hood and carinae of *Corythacia smithi* n. sp.

Fig. *b*, *Corythucha seguyi* n. sp.

Fig. *b′*, Side view of hood and median carina of *C. seguyi* n. sp.

Fig. *c*, *Corythucha mcelfreshi* n. sp.

Fig. *c′*, Side view of hood and median carina of *C. mcelfreshi* n. sp.

distinct cross band near the apex of the elytra. Length, 4.52 mm.; width 3 mm.

Hood moderately large, constricted slightly back of the middle, not so strongly deflected as in *unifasciata* Champ., slightly broader than high, its length about one and a half times its height. Median carina moderately arched, with single row of areolae (two or three extra cells at middle), about one-half as high as hood. Lateral carinae with five or six small cells, rather widely separated from hood. Costal area with three quite regular rows of large areolae. Bulbous elevations of elytra moderately large. Outer margins of elytra and paranota armed with numerous short spines. Nervures of elytra, hood and paranota with few spines.

General color above yellowish brown. Areolae mostly hyaline. Two spots on the paranota, a rather large spot on median carina, part of crest of hood, most of tumid elevation, and more or less of sutural area brown. Elytra with a transverse band near the base and another near the tip brown. Spines with black tips. Body black.

Four specimens, Cochabamba, Bolivia, S. A. Names in honor of Mr. E. Seguy, who kindly sent the material to me for study. *Types* in Paris Museum. *Paratypes* in my collection. The *type* is figured. More specimens may make this species a variety of *C. unifasciata*, but at present it seems best to consider it a distinct species.

Corythucha salicata Gibson.

In a long series of specimens from Oregon, Washington and Manitoba it is impossible to separate *C. drakei* Gib. from *C. salicata* Gib.; the latter name has priority. The insect feeds on willow, poplar, apple and alder.

Corythucha mollicula Osborn and Drake.

Numerous specimens at hand from Wisconsin, Michigan and New York positively connect up *C. salicis* O. & D. with *C. mollicula* O. & D. The species is quite variable in color and size; the hood is also somewhat variable in size and height. *Mollicula* and *salicis* represent the two most extreme forms before me, but as there are so many intermediate forms, it seems best not to consider the latter as a variety. The insects breed on various species of willows and poplars. It has been collected on cultivated currants in Montana by Cooley. There are two generations a year on willow and poplar in the Adirondack Mts., New York. Winter is spent in the mature state among the leaves and rubbish on the ground. The insect is a transcontinental species, extending throughout the northern part of the United States and southern part of Canada and south along the Atlantic states to South Carolina (*fide* Drake) and Florida (*fide* Osborn).

Parshley has made *C. canadensis* Parsh. a synonym of this species.

Corythucha arcuata var. **mali** Gibson.

Paratypes and other specimens in the collection of Mr. H. G. Barber and numerous specimens in my collection indicate *C. mali* Gibson to be a good color variety of typical *C. arcuata* Say. In the typical form as well as the variety, the size of the insect and the height of the hood is somewhat variable. The species breeds on various species of oaks, apple and occasionally on hard and soft maple.

Corythucha associata Osborn and Drake.

Numerous specimens from Ohio, Tennessee, New York, Maryland, New Jersey and Washington, D. C., make *C. spinulosa* Gibson a synonym of this species. The hood is slightly variable in size and color, but there seems to be no forms indicating good varieties. *Associata* O. & D. is slightly larger and has a more elevated hood than *C. aesculi* O. & D. This species and *C. pruni* O. & D. have been confused in literature by Gibson with *C. fuscomaculata* Stal. The latter has not been taken in eastern United States, but specimens are at hand from Arizona, Mexico and Central America. *C. fuscomaculata* is a very variable species in size, but structure and color pattern remain almost constant.

ENTOMOLOGICAL TRAINING AT THE UNIVERSITY OF FLORIDA*

The subject of a presidential address is one to which your retiring president has given much thought and consideration. Many subjects have presented themselves as being of adequate potential importance but have for one reason or another been discarded. The outcome is a very short paper on a topic which, it seems to me, is very important and of timely interest.

I readily assure you that I appreciate the size of the subject, and have no other idea in mind than that of presenting for your consideration my own views and then only for what they may be worth.

If, in the course of this discussion, any of you should gain the impression that my remarks are tainted with ambiguity or unjust criticism it will be deeply regretted. Ambiguity or unjust criticism is very remote from my thoughts. I may criticise,

*Address of the Retiring President, Geo. B. Merrill.

but it will be only for a constructive purpose and the criticism is justified by the fact, which is deplorable but nevertheless true, that entomological teaching at the University of Florida has been conspicuous more by reason of its absence than by its existence. By entomological training I do not mean hitting a few high places alone with bare essentials and leaving out the fundamentals necessary thereto.

In comparison with modern standards the University of Florida has, at this time, only an elementary course in Entomology for the students who attend the Agricultural College. It is not now for us to consider the reasons for this condition. Suffice it to say that the greatest cause has been the lack of funds, which is a common trouble and one for which those in charge of the University cannot be held responsible. Rather it is for us to consider what should be done in the matter of encouraging any plans which might be devised for the extension of the teaching of entomology in the institution.

Again it will be well to point out that Entomology holds a major position in the zoological and scientific world and that the close affiliation or relationship which this great branch of science holds to the whole field of agriculture and horticulture is of the greatest importance.

Pray tell me, of what value is it to the farmer to know how to build up his soil or how to grow large crops, if he does not know how to guard these crops or how to identify and deal with the insect in question? If this is of importance to the farmer himself, how much more so must it be to the man from whom the farmer seeks advice, namely, the County Agent? Certainly this adviser should possess something more than a mere superficial acquaintance with insects. To be really successful he must be "put through the mill" and made to know insects in a very intimate way.

Where is the County Agent to obtain this knowledge? Nowhere but in an Agricultural College where he can have the best of instruction, adequate laboratory equipment and good natural surroundings for extensive field work and experiments.

The necessity for a thorough working knowledge of Entomology is by no means restricted to the two above mentioned groups, i. e. the farmer and his local adviser. There are many fields of opportunity open to graduates in Entomology. Varied investigational and teaching problems seek men and few there

(Continued on page 58)

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THE HONEYBEES' OWN TROUBLES

By Frank Stirling

Honeybees, like everything else, have their troubles. Sometimes it is a lack of care on the part of their owners, but more frequently there are pests and enemies such as bee diseases, moths or wax worms, wild animals and ants, which make raids upon the colonies from time to time.

One of the most serious pests, especially in tropical and subtropical countries, are ants. The small black fire ant, the giant red ant and the wood ant frequently attack colonies of bees and sometimes destroy them entirely before the beekeeper discovers them.

A very striking incident of this nature was brought to the writer's attention several months ago when a large apiary on Biscayne Key, in Dade County, was attacked and seriously ravaged by the large red ant *(Camponotus abdominalis,* Fab.).

On this key or island, lying four or five miles off the mainland and across Biscayne Bay from Miami, Mr. C. E. Bartholomew was engaged in beekeeping and was operating some eight or nine hundred colonies of bees. The honey plants on this particular key are varied and many; shrubs and other plants such as mangrove, sumac, palms of many kinds, especially the scrub palmetto, are found in abundance. In and around the base of the scrub palmettoes many colonies of these red ants had made their homes, evidently attracted by the nectar produced by the blossoms of the palmetto and by the trash and litter commonly found around these plants.

These ants very soon discovered the whereabouts of the apiary and began to make nightly raids upon different colonies of bees.

Mr. Bartholomew at once began to combat these ants by the use of all methods known. For instance, the hives were placed on stands several inches above the ground and the legs or supports of these stands placed in cans containing water and oil. However, this procedure did not prove successful, for the ants would carry small particles of trash and sand and would bridge across the water in the cans and thereby gain entrance to the hives, where they would not only carry away the honey stored by the bees but would kill and feed upon the bee larvae. They would then back up into the empty cells of the honey comb with their heads at the entrances and bite off the legs and wings of the bees as they passed over, and otherwise worried and annoyed the bees until they left the hive. During one night these red ants completely cleaned out and destroyed as many as thirty-seven colonies, and during a period of a few weeks something over two hundred colonies of bees were destroyed.

An attempt was made to hunt up the nests of the ants and to destroy them with gasoline, but there were too many so that this remedy was impracticable. "Tanglefoot" was placed around the legs of the stands, but this three inch band of "tanglefoot" was successful only for a short time as the ants soon learned to cross over it.

Corrosive sublimate, mixed with axle grease and painted on the legs of the stands, was tried. This method was at first successful, for the ants would approach, examine it and then scamper off back to the scrub palmettoes; they would not linger a moment. But in about two weeks they became used to it and would wade right across it, wet or dry, paying no attention whatever to it. However, this method may be quite successful where the ants in the surrounding neighborhood are less plentiful.

Pans were then filled with oil (distillate) and the legs of the stands placed in the pans. This was satisfactory in so far as the pans and oil were concerned, as no ants succeeded in crossing, but they required constant attention to see that there was always oil in the pans and that no weeds or grass grew against the stands to serve as bridges for the ants. Seven colonies were lost where a single blade of grass came in contact with the stands so as to bridge the pans.

So it seemed that no means could be provided to control the ants as every method used by beekeepers elsewhere had been tried out and failed.

It became apparent that some other scheme must be tried in order to save the apiary. Luckily, on this island, it is possible to get tide-water at a depth of about three feet, so a moat about two feet wide and four feet deep was dug all around the apiary, and when this ditch was kept clean from trash it gave perfect protection. The ditching, however, did not prove entirely infallible, for four colonies were lost on account of a bridge across the moat made by a sweet-brier vine.

ENTOMOLOGICAL TRAINING AT THE UNIVERSITY OF FLORIDA

(Continued from page 55)

are who are competent to respond to these calls. Federal and state governments offer work of a more or less attractive nature, especially in plant quarantine departments, and those available for this class of work are fewer than the demand. Right here in Florida, for example, the State Plant Board and other agricultural agencies find much difficulty in maintaining a high degree of efficiency in their personnel, and if there is to be any great expansion we will have to go outside of the State to replenish our forces instead of being able to secure good material from our own state. This is not as it should be and reflects upon us.

The University of Florida should be turning out men fit to successfully cope with graduates of other institutions of like nature in their chosen entomological profession, whether it be for agricultural or horticultural work, teaching, advising, policing or any of the related commercial lines. It impresses me that this applies more particularly to those men leaving the College of Agriculture than to any of the other colleges for, after all, Florida is essentially an agricultural and horticultural state. The College of Agriculture should rank favorably with or exceed the great institutions of similar nature in other states. Its entomological work should be materially strengthened. There are vast opportunities here for the development of a Department of Entomology which are almost unparalleled in these United States. Our State College of Agriculture should not only be a Mecca for young students just beginning collegiate work but for advanced students as well. I am only too well aware that to accomplish such a great project will require time, patience and last, but not least, money. However, this is no reason why we should not look to the future, make suitable plans and then try to accomplish them, even though the beginnings be small.

The speaker has been informed that the budget which has been prepared outlining the desired activities of the College of Agriculture for the coming two years supports an item providing for the expansion of entomological teaching. Let us all hope that these plans will mature. But—and this is the great point I wish to make—even though the sought-for appropriations are not made, that is no reason why the College of Agriculture should not undertake to give more concentrated attention and more courses in entomology than has been the case in the past. I would not wish to be understood as meaning that these appropriations are not needed. The appropriations should be made and pressure brought to bear if the College of Agriculture wishes to develop and maintain its prestige among those of other states. Just above I spoke of small beginnings, and I wish now to cite such an example which started with a mere active interest on the part of a few individuals and developed into such magnitude that the whole University and others on the campus are proud of it. I refer to the course in beekeeping given to the vocational students. There is one thing lacking, however, in this course, and that was brought rather acutely to the foreground recently, when, in conjunction with the beekeeping course, a noted educator desired that the vocational students should have a course in Entomology. Some of you know the circumstances of this and realize what it means to the growth of the College of Agriculture.

There is no desire to minimize the great necessity for the appropriation as provided for in this budget. Indeed, it is, at the least, very modest when considered in connection with the provisions made in other states for like purposes and where less need for it exists. Assuming that the appropriation is made, it must be apparent that the course can be greatly strengthened and expanded if judicious use is made of the entomological "talent" already on the campus. It may be surprising to know that there are eight or nine entomologically trained men from as many universities or colleges of the country working on the campus. These men are not primarily engaged in teaching but the majority, nevertheless, are competent to teach the subject and give the College of Agriculture the prestige it needs to compete entomologically with other states.

It will be unfortunate if the appropriation is not made and it will be more so if we do not all try to do something more than to sit down and leave the responsibility upon the other fellow. Let us get together and do our little bit toward putting the budget over, thus securing for the University and especially for the College of Agriculture ample funds with which to carry forward and upward the expansion necessary for the benefit of the agricultural and horticultural interests of the State and Nation.

REPORTS OF MEETINGS OF THE FLORIDA ENTOMOLOGICAL SOCIETY

Jan. 24. Meeting called to order at 4:30 in Language Hall, President Merrill in the chair. New members elected were A. H. Beyer of the Experiment Station, S. H. Roundtree, Bureau of Entomology, U. S. D. A., Macclenny, Fla., and J. L. Lazonby, of the State Plant Board, Gainesville.

Professor Herbert Osborn was elected an honorary member of the Society.

This being the annual meeting for the election of officers the following were elected: President, Prof. J. R. Watson; Vice-President, P. W. Fattig; Secretary, Jeff Chaffin; Treasurer, E. W. Berger; Member of the Executive Committee, O. F. Burger. The staff of the Florida Entomologist was re-elected. It was moved and passed that the President appoint a committee of three, he to act as one, to solicit new members and assist the Treasurer in collecting dues. Messrs. F. M. O'Byrne and Frank Stirling were appointed. Under "Timely Notes" Mr. Stirling reported the recent destruction of over two hundred colonies of honey bees on Biscayne Key by ants *(Camponotus abdominalis floridanus)*, thirty-seven colonies being destroyed in one night.

Feb. 28. Meeting called to order in the usual place and hour by President Watson. Members present: Newell, Berger, O'Byrne, Montgomery, Burger, Stirling, Merrill, Reese, Beyer, Lazonby, and Chaffin. It was moved and passed that the President increase the committee on membership from three to five. Messrs. B. F. Floyd and W. W. Yothers, of Orlando, were appointed.

The paper of the evening was the address of the retiring president, Geo. B. Merrill, on the "Needs of Entomological Instruction at the University of Florida." The address was heartily endorsed by the Society and it was moved and passed that it be published in the next issue of the FLORIDA ENTOMOLO-

GIST. It was moved and passed that the Society endorse the proposed budget for the University of Florida.

March 28. Society called to order at 4:30 P. M., President Watson in the chair. The paper of the evening was "Bumble Bees" by Prof. P. W. Fattig. His talk was very interesting and highly appreciated by the Society. Professor Fattig also showed a lot of insects that mimic bumble bees in their appearance. How nearly certain robber-flies look like bumble bees was certainly a surprise. Under "Timely Notes" Prof. Watson exhibited some specimens of a large black thrips, *Idolothrips fuscipes,* recently captured near Gainesville. This is the third record of the capture of this insect, always on dry leaves.

J. CHAFFIN, Secretary.

SMOKER FOR PROFESSOR OSBORN

On the evening of January 17, the Society held a smoker in honor of Professor Herbert Osborn, who is spending the winter in Florida. The smoker was held in the office of the Nursery Inspector in Language Hall, with upwards of forty members and invited guests present. Dean Wilmon Newell acted as toastmaster and a very enjoyable evening was spent.

PERSONALS

Among those present at the meeting of the Farm Bureau in Gainesville on March 11 and 12 were Mr. DeBusk of Tavares, C. D. Kime of Orlando, and Frank Merrim of Dade City.

News has just reached us of the marriage last May of Mr. Eli K. Bynum, now inspector of the State Plant Board of Mississippi, located at Ocean Springs, Miss.

County Agents DeBusk of Lake County, Alfred Warren of St. Lucie, and K. E. Bragdon of Brevard are cooperating with the Department of Entomology of the Experiment Station in experiments in spraying for the control of thrips on citrus.

Arthur C. Mason of the U. S. Ent. Laboratory at Orlando, who recently underwent an operation for appendicitis, has returned to the laboratory.

On the evening of March 18, Dr. Davis addressed the Athenaeum Club at the University on the "Resources of Florida Waters."

Mr. J. C. Hamlin, who is employed by the Prickley Pear Board of the Commonwealth of Australia to collect for export to Australia insects and fungus diseases which give promise of being of value in their fight against this great cactus pest of Australia, has been searching for such material about Gainesville and Miami.

Mr. U. C. Loftin has resigned from the Bureau of Entomology to accept a very attractive offer as entomologist to a cotton growing company operating in the Laguna district of Mexico.

A course in Bee Keeping is being given by Mr. Frank Stirling to the vocational students in agriculture. Sixty students are now enrolled.

Mr. J. E. Graf is now in charge of the field work for the Bureau of Entomology on the Mexican Bean Weevil. In Special Report No. 3 (March 22) it is stated that at Birmingham, Ala., at least 20 per cent of the beetles have successfully passed thru hibernation, indicating a heavy infestation for the coming year and a widespread extension of the range which may reach well into Georgia and Tennessee.

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HOMOPTERA OF FLORIDA

HERBERT OSBORN

The following list is an attempt to bring together all available data on the Homopteran fauna of Florida. The list published by Professor Barber[1] naturally forms the basis for any such effort and I have included the records there given with the authorities. I have, however, adopted the nomenclature and arrangement of Van Duzee's Catalogue in the main, as this will be for many years the most convenient means of comparison.

The numerous additions to the Barber list are largely due to active collecting by Professor C. J. Drake, whose summer captures in 1918 were turned over to me for study and a number are due to specimens submitted to me by Professor J. R. Watson of the Florida Experiment Station, while a few trace back to earlier collections by Professor H. A. Gossard. Initials of these gentlemen will indicate the source for the species entered as also for the many Gainesville records that appear. The Gainesville locality records have a special value since so large a part of the previous records have been from coastal localities and in many cases represent only winter collecting. The value of such a list is of course dependent on the accuracy of the identification and I have endeavored to verify all the previous records as well as to satisfy myself as to the identity of the species newly entered. In any comparison with other regions for the purpose of determining the source of the fauna or the recent introduction of new arrivals it is very clear that reliable records for the regions

[1]In Bull. Am. Mus. Nat. Hist. Vol. 33, pp. 495-535 (1914).

compared are essential. While many of the native species are important pests some of the worst enemies to agriculture are probably introductions. A prompt recognition of new arrivals may serve a very useful purpose in preventing or reducing their destructive increase or distribution.

Note. Collections made by the writer during the winter of 1921 at St. Petersburg, Tampa, Key West, Homestead, Miami, Delray, West Palm Beach, Canal Point, LaBelle, Ft. Myers, Manatee, Ruskin and Gainesville have extended the known range of a number of the species as well as adding a number not hitherto recognized in the state. The latter are marked with an asterisk—*.

SUB ORDER HOMOPTERA

CICADIDAE

Tibicen biconica Walk. Key West, June (Acad. Nat. Sci. Phil.); Key West (Uhler); "Florida" (Macgillivray).

Tibicen bicosta Walk. La Grange, Sept. (Davis); "Southern Florida" (Uhler); "Florida" (Macgillivray). Common in the state but restricted to the South.

Tibicen linnei (S. & G.) Gainesville (?) (C. J. D.)

Tibicen pruinosa Say (S. & G.) Gainesville (C. J. D.)

Tibicen davisi (Sm. and Gr.) Miami, Georgiana (U. S. N. M.); Miami, Jan. (Davis); Miami, Sept. (Acad. Nat. Sci. Phil.).

Tibicen erratica (Osb.) Pablo Beach, Sept., Big Pine Key, Sept. (Davis). Oviposits in cotton stems.

Tibicen grossa (Fab.) Ormond (Mrs. Slosson).

Tibicen lyricen (de Geer) Lake City (U. S. N. M.); "Florida" (Sm. and Gr.).

Tibicen reperta (Uhl.) "Florida" (Uhler).

Tibicen sayi (Sm. and Gr.) LaBelle, Apr. (Davis); "Florida" (U. S. N. M.).

Tibicen sayi var. *australis* (Davis). La Grange, Sept. (Davis).

Tibicen similaris (Sm. and Gr.) Fernandina (U. S. N. M.); Jacksonville, Sept., La Grange, Sept. (Davis).

Tibicen viridifascia (Walk.) (*sordidata* Uhl.); "Southern Florida". Oviposits in stems of Sea Oats *(Uniola)* and lives in tidal zone of shore line as observed in North Carolina. (See Osborn & Metcalf. Annals E. S. A., Vol. 13, p. 108.)

Tibicen vitripennis Say. "Florida" (Uhler).

Tibicen hieroglyphica Say. "Apparently common throughout the southern portion of Florida" (Van Duzee); Ormond (Mrs. Slosson); Lakeland, Mch., May, LaBelle, Apr., LaGrange, Sept. (Davis); St. Augustine (Johnson). Gainesville (C. J. D.)

Melampsalta parvula Say. Tampa (Van Duzee); Lakeland, May (Davis). North to Ohio, common.

MEMBRACIDAE

Ceresa stimulea Van D. Estero (Van Duzee); Ormond, Jacksonville (Mrs. Slosson).

Ceresa brevistylus Van D. Crescent City, Sanford (Van Duzee and A. M. N. H.). "Flat woods," Gainesville, Aug. 25. (J. R. W.)

Ceresa patruelis Stal. "Florida" (Van Duzee).

Stictocephala diminuta Van D. Biscayne Bay (Mrs. Slosson).

Stictocephala festina Say. Crescent City, St. Petersburg (Van Duzee); Gainesville. (J. R. W.)

Sticticephala lutea Walk. Walton Co. (McAtee).

Stictocephala substriata Walk. Belleair, Jacksonville, Ormond, Atlantic Beach (Mrs. Slosson); Sanford, Miami, Titusville, Lakeland, Jacksonville, Crescent City, LaBelle, Ft. Myers, (A. M. N. H.); St. John's Bluff, E. Florida (Walker); Gainesville (C. J. D.).

Acutalis inornata Ball. Biscayne Bay (Mrs. Slosson).

Acutalis tartarea Say. "Taken at all stations" (Van Duzee); Atlantic Beach, Jacksonville, Ormond (Mrs. Slosson); Sanford, Crescent City (A. M. N. H.); Gainesville (C. J. D., J. R. W.).

Acutalis tartarea var. *semicrema* Say. St. Augustine (Johnson); Gainesville (C. J. D.).

Micrutalis calva Say. "Generally distributed in the State" (Van Duzee); Newberry (A. M. N. H.; Biscayne Bay, Belleair, Lake Worth, Ormond (Mrs. Slosson); Gainesville (J. R. W.).

Telamona collina Walk. St. John's Bluff, E. Florida (Walker).

Telamona conica Walk. St. John's Bluff, E. Florida (Walker).

Telamona monticola Fab. Seven Oaks (Van Duzee).

Telamona praealta Fowl. Tampa (Van Duzee).

Telamona subfalcata Van D. Belleair (Mrs. Slosson); Gainesville (C. J. D.).

Archasia galeata (Fab.) Estero (Van Duzee); Jacksonville (Mrs. Slosson); St. Augustine (Johnson); Gainesville, April (J. R. W.).

Smilia camelus (Fab.) Jacksonville (Mrs. Slosson); Gainesville, April (J. R. W.).

Similia fasciata A. and S. Lake Worth, Jacksonville (Mrs. Slosson).

Cyrtolobus ovatus Van D. Sanford, Estero (Van Duzee); Marco, Apr. (A. M. N. H.).

Crytolobus arcuatus (Emm.) Ormond (Mrs. Slosson).

Crytolobus fenestratus (Fh.) Jacksonville (Mrs. Slosson); Gainesville (C. J. D.).

Crytolobus sculptus Fairm. Jacksonville (Mrs. Slosson).

Crytolobus nitidus Van D. Jacksonville (Mrs. Slosson).

Cytolobus tuberosus (Fairm.) Belleair (Mrs. Slosson).

Cyrtolobus tumidus (Walk.) St. John's Bluff, E. Florida (Walker).

Cyrtolobus vau (Say). Belleair, Jacksonville (Mrs. Slosson).

Cyrtolobus inermis (Emm). Jacksonville (Mrs. Slosson).

Antianthe expansa Germ. "Florida" (Van Duzee).

Ophiderma flavicephala Godg. "Florida" (Van Duzee); Gainesville (C. J. D.).

Ophiderma salamandra Fairm. Tampa, Sevenoaks (Van Duzee); Jacksonville (Mrs. Slosson).

Stictolobus 3-lineatus Funk. Gainesville (C. J. D.).

Idioderma virescens Van D. "Taken occasionally at all places where I worked" (Van Duzee); Estero (Van Duzee); Sanford, Clearwater (A. M. N. H.); Gainesville (C. J. D.); St. Petersburg (H. O.).

Idioderma varia Van D. Estero (Van Duzee).

Vanduzea triguttata (Burm.) St. Petersburg, Estero, Sevenoaks (Van Duzee); Jacksonville (Mrs. Slosson).

Entylia concisa Walk. Crescent City (Van Duzee).

Entylia sinuata (Fab.) Crescent City. Sanford, Ft. Myers (Van Duzee); St. Augustine (Johnson); Gainesville (J. R. W.).

Umbonia crassicornis (A. & S.) "Florida" (Amy. et Serv). No modern records.

Platycotis vittata Fab. "Florida" (Goding); St. Augustine (Johnson); LaBelle on water oak (H. O.). Occurs in two forms—spotted and striped.

Platycotis sagittata Germ. Crescent City. Sevenoaks (Van Duzee).

Enchenopa binotata Say. St. Augustine (Johnson).

Campylenchia latipes (Say). Gainesville (C. J. D.).

Tylopelta brevis Van D. Crescent City (Van Duzee).

Centruchoides perdita A. and S. Jacksonville (Mrs. Slosson).

CERCOPIDAE

Tomaspis bicincta (Say). Sanford, Ft. Myers (Van Duzee); Lake Worth, Biscayne Bay (Mrs. Slosson); Clearwater, Apr., Ft. Myers, Nov., Mch., Everglade, Apr. (A. M. N. H.); Gainesville (J. R. W.).

Aphrophora quadrinotata Say. "Florida" (Ball).

Aphrophora saratogensis (Fitch). Crescent City (Van Duzee); Jacksonville (Mrs. Slosson); Gainesville (C. J. D.).

Lepyronia angulifera Uhl. "Found in moderate numbers at all places where I collected in Florida" (Van Duzee); Biscayne Bay (Mrs. Slosson); Sanford, Clearwater, Crescent City, Ft. Myers, LaBelle, Tampa, Punta Gorda, Lakeland, Newberry (A. M. N. H.).

Lepyronia quadrangularis Say. "Florida" (Ball); Gainesville (C. J. D.).

Clastoptera obtusa (Say). This very common northern species has been taken at Gainesville. (C. J. D.)

Clastoptera proteus var. *saint-cyri* Prov. Crescent City (Van Duzee).

Clastoptera proteus var. *vittata* Ball. Sevenoaks (Van Duzee).

Clastoptera xanthocephala Germ. "Abundant everywhere in Florida" (Van Duzee); Biscayne Bay, Belleair (Mrs. Slosson); Clearwater, Sanford, Crescent City, Jacksonville (A. M. N. H.); Gainesville (C. J. D., J. R. W.); St. Petersburg and numerous other points (H. O.).

Clastoptera xanthocephala var. *glauca* Van D. Ormond, Biscayne Bay (Mrs. Slosson); St. Petersburg, Miami (A. M. N. H.); Gainesville (J. R. W.).

FAM. CICADELLIDAE

Sub. Fam. Bythoscopinae

Agallia novella (Say). Crescent City (Van Duzee); Gainesville (C. J. D., J. R. W.); Lake City (Col. Ag. Exp. Sta.).

Agallia constricta Van D. Crescent City. Sanford, (Van Duzee and A. M. N. H.); Ormond, Jacksonville, Atlantic Beach (Mrs. Slosson); Gainesville (C. J. D.); Lake City (Coll. Ag. Exp. Sta.); St. Petersburg (H. O.) abundant and of economic importance.

Agallia 4-punctata Prov. (H. L. Dozier).

Agallia deleta Van D. Crescent City, Sanford, Ft. Myers, (Van Duzee); Belleair (Mrs. Slosson).

Agallia sanguinolenta Prov. Crescent City, Sanford (Van Duzee); Lake Worth (Mrs. Slosson); Gainesville (C. J. D.); St. Petersburg (H. O.). Widely distributed and injurious.

Agallia immaculata Lath. Gainesville (C. J. D.)

Agallia lyrata Baker. Crescent City (Van Duzee).

Agallia variata Uhl. Lake Worth (Mrs. Slosson).

Agallia oculata Van D. Gainesville (C. J. D.).

Idiocerus nervatus Van D. Crescent City (Van Duzee).

Sub. Fam. Cicadellinae

Oncometopia lateralis (Fab.) Crescent City, Sanford, Tampa (Van Duzee); Sanford, Clearwater. Jacksonville (A. M. N. H.); St. Augustine (Johnson). Gainesville (C. J. D.); especially common on sunflowers (J. R. W.). St. Petersburg (H. O.).

Oncometopia undata (Fab.) "Found commonly throughout Florida" (Van Duzee); Jacksonville, Ormond (Mrs. Slosson); Clearwater, Sanford, Lakeland, Miami, Key Largo (A. M. N. H.); St. Augustine (Johnson); Lake Wales, Gainesville (J. R. W.).

Homalodisca triquetra (Fab.) Sanford, Sevenoaks (Van Duzee); Sanford, Clearwater (A. M. N. H.); Gainesville (J. R. W.).

Aulacizes guttata Uhl. Ft. Myers (Van Duzee); Biscayne Bay (Mrs. Slosson); Ft. Myers, Deep Lake, Apr. (A. M. N. H.).

Aulacizes irrorata (Fab.) Lake Worth, Biscayne Bay (Mrs. Slosson); Crescent City, Sanford, Apr. (A. M. N. H.). Gainesville (J. R. W.); Lake City (A. L. Quaintance).

Aulacizes pollinosa Fowl.

Cicadella occatoria (Say). Crescent City, Sanford (Van Duzee); Crescent City (A. M. N. H.); Atlantic Beach, Jacksonville (Mrs. Slosson); "Florida" (Ball); Gainesville (J. R. W., C. J. D.); St. Petersburg (H. O.).

Kolla bifida (Say). Gainesville (C. J. D., J. R. W.).

Kolla bifida fasciata (Walk.) "Common everywhere in Florida" (Van Duzee); Biscayne Bay. Jacksonville, Belleair (Mrs. Slosson); Crescent City, LaBelle, Ft. Myers, Lakeland (A. M. N. H.); "Florida" (Ball); St. Petersburg (H. O.).

Kolla geometrica (Sign.) "Common in Florida" (Van Duzee); Crescent City, Sanford (A. M. N. H.); Belleair (Mrs. Slosson), Gainesville, (H. L. D. C. J. D.); Bradentown (J. R. W.); St. Petersburg (H. O.).

Kolla hartii (Ball) Ft. Myers, Estero (Van Duzee); Ormond, Biscayne Bay, Lake Worth (Mrs. Slosson); Ft. Myers, LaBelle (A. M. N. H.). Destructive in grass; St. Petersburg (H. O.)

Kolla similis (Walk.) Biscayne Bay. (Mrs. Slosson; Miami (A. M. N. H.) Common in West Indies and Central America. Possibly a recent introduction.

Graphocephala coccinea (Forst.) Crescent City, Sanford, (Van Duzee and A. M. N. H.); Ft. Myers (Van Duzee); Jacksonville, Atlantic Beach (Mrs. Slosson); St. Augustine (Johnson); Gainesville (C. J. D.); St. Petersburg (H. O.) Abundant and affecting many kinds of plants.

Graphocephala versuta Say. "Taken everywhere in Florida" (Van Duzee); Biscayne Bay, Ormond, (Mrs. Slosson); Sanford, South Bay of L. Okeechobee (A. M. N. H.). Gainesville (C. J. D., J. R. W., H. L. D.). Lake Wales (J. R. W.); St. Petersburg (H. O.). Very common and certainly injurious.

Draeculacephala floridana Ball. Charlotte Harbor (Mrs. Slosson); Everglade (A. M. N. H.); St. Petersburg, Salt Marsh Meadow (H. O.)

Draeculacephala balli Van D. Gainesville (C. J. D.)

Draeculacephala acuta Walk. South Bay of L. Okeechobee (A. M. N. H.); St. John's Bluff, E. Florida (Walker).

Draeculocephala mollipes Say. Crescent City, Clearwater, (Van Duzee); Belleair, Ormond, Lake Worth, (Mrs. Slosson) South Bay of L. Okeechobee (A. M. N. H.). Very widely distributed and injurious.

Draeculacephala mollipes minor Walk. "Taken in damp places and near water in most localities where I collected in Florida" (Van Duzee); Ormond (Mrs. Slosson); Ft. Myers, Lakeland, Crescent City, Sanford (A. M. N. H.)

Draeculacephala inscripta Van D. Gainesville (C. J. D.)

Draeculacephala reticulata Sign. St. Petersburg, Estero (Van Duzee; Belleair, Biscayne Bay, Ormond, Jacksonville, (Mrs. Slosson); Everglade, Marco, LaBelle, Ft. Myers (A. M. N. H.); Lake City (H. A. G.); Moore Haven, Gainesville, (J. R. W.); St. Petersburg, Key West, Miami, and at almost every locality visited (H. O.) Very injurious to grasses and cereals.

The

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Draeculacephala 7-guttata Walk. "Generally distributed but not common in Florida" (Van Duzee); Jacksonville, Ormond, Biscayne Bay. Belleair, Lake Worth (Mrs. Slosson); Titusville, Punta Gorda, Sanford (A. M. N. H.) Gainesville (C. J. D.); St. Petersburg (H. O.).

Penthima americana Fitch. "Taken everywhere in Florida" (Van Duzee); Charlotte Harbor, Biscayne Bay, Jacksonville, (Mrs. Slosson); Clearwater, Sanford, Ft. Myers, Jacksonville (A. M. N. H.); St. Augustine (Johnson). Gainesville (C. J. D.); St. Petersburg (H. O.)

Gypona rugosa Spangb. Belleair (Mrs. Slosson); Lakeland, Jacksonville (A. M. N. H.)

Gyona 8-lineata (Say). "Common everywhere in Florida" (Van Duzee); Biscayne Bay, Jacksonville (Mrs. Slosson); Lakeland, Ft. Myers, Crescent City, Sanford, Jacksonville (A. M. N. H.). Gainesville, (C. J. D. H. L. D.)

Gypona albosignata Uhl. Jacksonville (Mrs. Slosson).

Gypona scarlatina var. *citrina* Spangb. Crescent City, Sanford, (Van Duzee); Atlanta Beach (Mrs. Slosson); Gainesville, Common. Canal Point (H. O.)

Gypona irrorella Spangb. Ft. Myers (Van Duzee); La Belle, Ft. Myers (A. M. N. H.)

Gypona striata Burm. "Florida" (Van Duzee); Ormond, Biscayne Bay, Jacksonville (Mrs. Slosson).

Gypona tenella Spangb. Sanford, Sevenoaks (Van Duzee); Lakeland May (A. M. N. H.); Biscayne Bay (Mrs. Slosson).

Gypona sanguinolenta Spangb. Sanford, Ft. Myers (Van Duzee); Jacksonville (Mrs. Slosson).

Gypona scarlatina Fitch. Miami (A. M. N. H.).
Gypona miliaris Stal. Gainesville (C. J. D.).
Gypona resima Fowl. Gainesville (C. J. D.).
Xerophloea viridis Fab. Biscayne Bay (Mrs. Slosson); St. Augustine (Johnson).

Sub. Fam. Jassinae

Xestocephalus pulicarius Van D. Crescent City, Ft. Myers (Van Duzee); Everglade (A. M. N. H.). Gainesville (C. J. D.); St. Petersburg (H. O.)
Xestocephalus tessellatus Van D. Jacksonville, Belleair, Biscayne Bay, Charlotte Harbor (Mrs. Slosson); LaBelle, Apr. (A. M. N. H.).
Dorycephalus vanduzei Osb. and Ball. Clearwater (Van Duzee); St. Petersburg, Ruskin (H. O.).
Dorydiella floridana Baker. "Florida" (Baker).
Hecalus apicalis Van D. Crescent City, St. Petersburg, Estero (Van Duzee); Punta Gorda (A. M. N. H.).
Neoslossonia putnami (Osb.) Sanford (Van Duzee); Jacksonville (Mrs. Slosson).
Spangbergiella mexicana Baker. Biscayne Bay (Mrs. Slosson); Gainesville (C. J. D.); St. Petersburg (H. O.)
Spangbergiella vulnerata Uhl. Crescent City, Sanford, St. Petersburg, Ft. Myers (Van Duzee); Belleair, Ormond (Mrs. Slosson); Lakeland Nov. (A. M. N. H.); Gainesville (C. J. D.); St. Petersburg (H. O.)
Parabolocratus flavidus Sign. "Taken at most of the places where I collected but not at all common" (Van Duzee); Punta Gorda. Nov. (A. M. N. H.); Gainesville (C. J. D.); St. Petersburg, common. (H. O.)
**Platymetopius elegans* Van D. (?) Tampa, on live oak (H. O.).
Platymetopius frontalis Van D. Jacksonville, Biscayne Bay (Mrs. Slosson); Ft. Myers, Apr. (A. M. N. H.). Gainesville (C. J. D. J. R. W.). St. Petersburg (H. O.)
Platymetopius parvus Lath. Gainesville (C. J. D.).
Platymetopius loricatus Van D. Sevenoaks, St. Petersburg, Ft. Myers (Van Duzee); Belleair (Mrs. Slosson).
Platymetopius magdalensis Prov. Gainesville (C. J. D.).
Platymetopius nasutus Van D. Belleair (Mrs. Slosson).
Platymetopius slossoni Van D. Jacksonville (Mrs. Slosson); Jacksonville, Newberry (A. M. N. H.). Gainesville (C. J. D., H. L. D., J. R. W.)

Platymetopius verecundus Van Duzee. Crescent City, Sanford, Sevenoaks, Clearwater, Estero (Van Duzee); Sanford (A. M. N. H.). Gainesville (C. J. D.).

Scaphoideus scalaris Van D. Jacksonville, Nov. (A. M. N. H.).

Scaphoideus unicolor Osb. Sanford (Van Duzee) Gainesville (C. J. D.).

Scaphoideus consors Uhl. Crescent City (Van Duzee).

Scaphoideus fasciatus Osb. Gainesville (C. J. D.).

Scaphoideus cruciatus Osb. Marco, Everglade, Apr. (A. M. N. H.); Clearwater, Ft. Myers (Van Duzee); Biscayne Bay (Mrs. Slosson). Gainesville (C. J. D.).

Scaphoideus obtusus Osb. Crescent City, Sanford, Sevenoaks, Ft. Myers (Van Duzee).

Scaphoideus albonotatus Van D. Estero (Van Duzee).

Scaphoideus auronitens Prov. Biscayne Bay. (Mrs. Slosson); Crescent City, Apr. (A. M. N. H.).

Scaphoideus immistus Say. Crescent City, Apr. (A. M. N. H.).

Scaphoideus jucundus Uhl. Estero (Van Duzee).

Scaphoideus neglectus Osb. Crescent City, St. Petersburg (Van Duzee); Biscayne Bay (Mrs. Slosson). Gainesville, (C. J. D.).

Scaphoideus opalinus Osb. Sevenoaks (Van Duzee).

Deltocephalus slossoni Ball. Biscayne Bay (Mrs. Slosson).

Deltocephalus inflatus Osb. and Ball. Crescent City, Estero, Sevenoaks (Van Duzee).

Deltocephalus visendus Crumb. Gainesville.

Deltocephalus reflexus Osb. and Ball. Belleair (Mrs. Slosson).

Deltocephalus fraternus Ball. Jacksonville (Mrs. Slosson); Lakeland, Newberry, Clearwater, Jacksonville (A. M. N. H.). Gainesville, (C. J. D.). St. Petersburg, Ruskin and many other places on grass in "flatwoods". (H. O.)

Deltocephalus misellus Ball. Jacksonville, Nov. (A. M. N. H.).

Deltocephalus weedi Van D. Crescent City, Clearwater, Sevenoaks, Estero (Van Duzee); Biscayne Bay (Mrs. Slosson); Jacksonville, Nov. (A. M. N. H.). Gainesville (J. R. W.)

Deltocephalus micarius Ball. Sevenoaks, Sanford (Van Duzee).

Deltocephalus obtectus Osb. and Ball. "Taken occasionally at nearly all places where I worked in Florida" (Van Duzee); Belleair, Biscayne Bay (Mrs. Slosson); Newberry, Jacksonville, Lakeland, Nov. (A. M. N. H.). Gainesville (C. J. D.). Lake City (H. A. G.) Common on Bermuda grass and doubtless destructive.

Deltocephalus compactus Osb. and Ball. Gainesville (C. J. D.).

Deltocephalus flavicosta Stal. Biscayne Bay, Atlantic Beach (Mrs. Slosson); Lakeland, LaBelle, Titusville, Key Largo, Everglade, Sanford (A. M. N. H.). Gainesville (C. J. D. J. R. W.). St. Petersburg, Largo, etc. (H. O.)

**Deltocephalus marinus* Osb. and Metcalf. Long Key, Pinellas Co. (H. O.).

Deltocephalus littoralis Ball. St. Petersburg (Van Duzee); Everglade, Apr. (A. M. N. H.). At shoreline on grasses subject to submergence at high tide as observed in N. C.

Deltocephalus caperatus Ball. Sevenoaks (Van Duzee).

Deltocephalus balli Van D. Lake Worth (Mrs. Slosson). St. Petersburg (H. O.)

Deltocephalus mendosus Ball. Estero (Van Duzee); Lake City (Gossard).

**Deltocephalus satur* Ball. St. Petersburg (H. O.).

Deltocephalus sonorus Ball. Estero, St. Petersburg (Van Duzee); Ormond, Belleair, Biscayne Bay (Mrs. Slosson); St. Petersburg (H. O.).

Lonatura bicolor Van D. St. Petersburg, Largo, Ruskin. Fairly common at some points in "flatwoods" on grasses (H. O.)

Euscelis bicolor (Van D.) Crescent City, Tampa, St. Petersburg (Van Duzee). Gainesville (C. J. D. J. R. W.). Lake City (A. L. Quaintance). Bradentown J. R. W.

Euscelis exitiosus (Uhl.) "Common everywhere in Florida" (Van Duzee): Biscayne Bay, Belleair, Ormond, Lake Worth, Jacksonville (Mrs. Slosson); Punta Gorda, Marco (A. M. N. H.). Gainesville (C. J. D. J. R. W.). Lake City (H. A. G.). Moore Haven (J. R. W.)

Euscelis obtutus (Van D.) Crescent City (Van Duzee); St. Petersburg (H. O.)

Eutettix bartschi Van D. Sevenoaks, Estero (Van Duzee); Ormond, Biscayne Bay, Atlantic Beach (Mrs. Slosson); St. Petersburg, Miami (A. M. N. H.).

Eutettix lurida Van D. Titusville, Nov. (A. M. N. H.); St. Augustine (Johnson).

Eutettix marmoratus Van D. "Florida" (Ball).

Eutettix slossoni Van D. Sanford, St. Petersburg, Sevenoaks, Ft. Myers (Van Duzee); Biscayne Bay (Mrs. Slosson); Clearwater (A. M. N. H.). Gainesville (C. J. D.)

Eutettix nitens Van D. Sevenoaks, Estero (Van Duzee).

Eutettix picta Van D. "Florida" (Ball). Gainesville (C. J. D.).

Eutettix seminuda (Say). Gainesville (C. J. D., J. R. W.); Lake City (Gossard).

Eutettix cincta Osb. and Ball. Gainesville (C. J. D.).

Eutettix tristis Ball. "Florida" (Ball).

**Phlepsius distinctus* Lathrop. St. Petersburg (H. O.).

Phlepsius attractus Ball. Jacksonville (Mrs. Slosson).

Phlepsius cinereus Van D. Biscayne Bay (Mrs. Slosson).

Phlepsius collitus Ball. Jacksonville (Mrs. Slosson).

Phlepsius costomaculatus Van D. Belleair, Biscayne Bay (Mrs. Slosson); Crescent City, Sanford, Sevenoaks, St. Petersburg, Ft. Myers (Van Duzee); LaBelle (A. M. N. H.). Gainesville (J. R. W.). Clearwater (Gossard).

Phlepsius decorus Osb. and Ball. Tampa (Van Duzee).

Phlepsius excultus Uhl. Crescent City, Sanford, Sevenoaks, Ft. Myers (Van Duzee); Jacksonville, Biscayne Bay (Mrs. Slosson); Crescent City, Sanford, Marco (A. M. N. H.); St. Augustine (Johnson). Gainesville (J. R. W.). Clearwater (Gossard).

Phlepsius floridanus Ball. Biscayne Bay (Mrs. Slosson).

Phlepsius fulvidorsum Fitch. "Florida" (Van Duzee).

Phlepsius fuscipennis Van D. "Common everywhere in suitable locations" (Van Duzee); Lake Worth, Belleair, Biscayne Bay. Jacksonville (Mrs. Slosson); Newberry, Punta Gorda, Nov. (A. M. N. H.). Bradentown (J. R. W.)

Phlepsius irroratus Say. Jacksonville (Mrs. Slosson).

Phlepsius lippulus Ball. Biscayne Bay (Mrs. Slosson).

Phlepsius mimus Baker. Crescent City (Van Duzee).

Phlepsius nebulosus Van D. "Florida" (Van Duzee).

Phlepsius nudus Ball. Sevenoaks, Ft. Myers (Van Duzee).

Phlepsius punctiscriptus Van D. Belleair, Charlotte Harbor (Mrs. Slosson).

Phlepsius slossoni Ball. Biscayne Bay (Mrs. Slosson).

Phlepsius truncatus Van D. Crescent City, Sevenoaks (Van Duzee).

Acinopterus acuminatus Van D. Tampa, Sanford (Van Duzee); Biscayne Bay (Mrs. Slosson); Jacksonville, Newberry, Miami, Nov. (A. M. N. H.). Gainesville (C. J. D.); St. Petersburg (H. O.).

**Thamnotettix aureovittatus* Sand. & DeL. Described from Big Bayou and St. Petersburg.

Thamnotettix comata Ball. Crescent City, Sanford, Sevenoaks, St. Petersburg (Van Duzee); Belleair (Mrs. Slosson); LaBelle, Nov. (A. M. N. H.).

Thamnotettix orbonata Ball. Biscayne Bay (Mrs. Slosson).

Thamnotettix nigrifrons (Forbes). Crescent City, Sanford, St. Petersburg (Van Duzee); Jacksonville, Ormond, Belleair, Atlantic Beach (Mrs. Slosson); Crescent City, LaBelle, Titusville (A. M. N. H.). Abundant—destructive to grasses and cereal crops.

Thamnotettix colonus (Uhl.) Gainesville, St. Petersburg (H. O.) An abundant species in grass lands.

Thamnotettix subcuprea (Prov.) Sanford, Sevenoaks, Ft. Myers (Van Duzee); Jacksonville (Mrs. Slosson).

Thamnotettix brittoni Osb. Gainesville (C. J. D.).

Chlorotettix galbanata Van D. Ft. Myers (Van Duzee).

Chlorotettix minima Baker. Estero (Van Duzee).

Chlorotettix necopina Van D. Crescent City, Sanford, Sevenoaks, Clearwater (Van Duzee); Biscayne Bay, Ormond (Mrs. Slosson); LaBelle, Titusville, Jacksonville, Sanford (A. M. N. H.). Gainesville (C. J. D.); St. Petersburg (H. O.) Common in coarse grasses.

Chlorotettix rugicollis Ball. "Taken at most places where I worked" (Van Duzee); Jacksonville (Mrs. Slosson); Jacksonville, Lakeland, Newberry, Ft. Myers (A. M. N. H.). Gainesville (C. J. D.); St. Petersburg, Ruskin, Delray. Common. (H. O.)

Chlorotettix spatulata Osb. and B. Jacksonville (Mrs. Slosson).

Chlorotettix tergatus (Fitch). "Florida" (Van Duzee).

Chlorotettix tunicata Ball. Sanford, Clearwater, Estero, St. Petersburg (Van Duzee); Belleair, Biscayne Bay (Mrs. Slosson); Marco, Sanford, Miami (A. M. N. H.).

Chlorotettix viridius Van D. "Taken at all places where I worked," St. Petersburg, Sevenoaks (Van Duzee); Belleair (Mrs. Slosson); Sanford, Clearwater (A. M. N. H.). An abundant species in grass lands.

Jassus olitorius Say. "Common everywhere in Florida" (Van Duzee); Ormond, Belleair, Charlotte Harbor (Mrs. Slosson); Sanford, Estero, Clearwater, Crescent City, LaBelle, Marco, Lakeland, Titusville, Jacksonville (A. M. N. H.); St. Augustine (Johnson). Gainesville (C. J. D.). Common in woodland. Lake City (Exp. Sta. Coll.)

Jassus melanotus Spang. Gainesville (J. R. W.).

Jassus borealis Spang. Bradentown (J. R. W.).

Neocoelidia tumidifrons Gill. and Bak. Jacksonville (Mrs. Slosson); St. Petersburg (H. O.)

Paracoelidea tuberculata Baker. Sevenoaks (Van Duzee); Jacksonville (A. M. N. H.). Common on pines.

Tinobregmus vittatus Van D. Biscayne Bay. (Mrs. Slosson).

Cicadula 6-notata Fall. Sanford, Ft. Myers (Van Duzee). Gainesville.

Balclutha impicta Van D. Crescent City (Van Duzee). var. *medius* Bak.

Eugnathodus abdominalis Van D. Sanford, Clearwater, Ft. Myers (Van Duzee); Biscayne Bay, Ormond (Mrs. Slosson). Abundant in grasses.

Protolebra braziliensis Bak. Belleair, Biscayne Bay (Mrs. Slosson).

Empoasca flavescens Fab. Crescent City, Estero (Van Duzee).

Empoasca mali LeB. Crescent City, Sanford, Ft. Myers, Estero (Van Duzee); Jacksonville (Mrs. Slosson).

Empoasca viridiscens Walsh. (Van Duzee Cat.)

Empoasca unicolor Gill. Ormond (Mrs. Slosson).

**Empoasca minuenda* Ball. On avocado W. Palm Beach (G. F. Moznette).

Typhlocyba flavoscuta Gill. Sanford, Sevenoaks (Van Duzee).

Typhlocyba rubricata Van D. Crescent City (Van Duzee).

Erythroneura comes Say. Crescent City, Sevenoaks, Estero (Van Duzee); Jacksonville (A. M. N. H.).

FULGORIDAE

Cyrpoptus belfragei Stal. Tampa (Van Duzee); St. Augustine, Nov. (Engelhardt. and Johnson). Enterprise?

Cyrpoptus reineckii Van Duzee. Widely distributed in the state. Estero (Mrs. Slosson); Jacksonville (Sleight); Sanford, Clearwater, St. Petersburg, Apr., Jacksonville, May (A. M. N. H.). Gainesville (C. J. D. J. R. W.)

Dictyophara lingula Van D. Estero (Van Duzee); Punta Gorda, Lakeland, Nov. (Davis); Ormond (Mrs. Slosson); Punta Gorda, Nov. (A. M. N. H.) Gainesville (C. J. D. J. R. W.)

Dictyophara microrhina Walk. Jacksonville, Lakeland (Davis); Ft. Myers, Lakeland, Nov. (A. M. N. H.); St. Augustine (Johnson). Gainesville (J. R. W.)

Scolops spurcus Uhl. Gainesville (C. J. D.).

Scolops angustatus Uhl. St. Augustine (Johnson).

Scolops desiccatus Uhl. Crescent City, Sanford (Van Duzee).

Scolops sulcipes Say. "Florida" (Uhler). Gainesville (J. R. W.); Common over large part of Eastern United States.

Phylloscelis atra Germ. St. Petersburg, Sevenoaks, Ft. Myers and Estero (Van Duzee); Ft. Myers, Jacksonville, Miami, Nov. (A. M. N. H.). Gainesville. Widely distributed.

Phylloscelis atra var. *albovenosa* Mel.

Phylloscelis pallescens Germ. Estero (Van Duzee).

Tangia sponsa Uhl. "Southern Florida" (Uhler).

Monopsis tabida Spin. "Florida" (Van Duzee).

Catonia picta Van D. Estero (Van Duzee); Gainesville (C. J. D.).

Catonia bicinctura, Punta Gorda, Newberry (Van Duzee). Gainesville (C. J. D.).

Ellidiptera floridae Walk. Newberry (Davis).

Ellidiptera pallida Say. "Florida" (Say).

Bothriocera tinealis Burm. Charlotte Harbor, Biscayne Bay (Mrs. Slosson). Gainesville (J. R. W. C. J. D.)

Bothriocera signorite?

Bothriocera undata Fab. "Was taken everywhere I collected in Florida" (Van Duzee); Lake Worth, Biscayne Bay, Ormond (Mrs. Slosson).

Oliarus quinquelineatus Say. Jacksonville (Mrs. Slosson). Common over Eastern United States.

Oliarus placitus Van D. Ft. Myers, May (Van Duzee); Gainesville (C. J. D. J. R. W.).

Oliarus vicarius Walk. Estero, Ft. Myers, St. Petersburg, Clearwater, Sevenoaks. (Van Duzee); Jacksonville, Ormond, Charlotte Harbor (Mrs. Slosson); Marco, Apr. (A. M. N. H.); St. Augustine (Johnson). Gainesville (C. J. D.).

Oliarus complectus Ball. St. Petersburg, Sevenoaks, Estero (Van Duzee); Key Largo, Nov. (A. M. N. H.). abundant and widely distributed.

Oliarus slossoni Van D. Belleair, Biscayne Bay (Mrs. Slosson).

Oliarus difficilis Van D. Belleair (Mrs. Slosson).

Monorhachis sordulentus Uhl. Lake Worth (Mrs. Slosson); Gainesville.

Cixius dorsivittatus Van D. Crescent City (Van Duzee); Biscayne Bay (Mrs. Slosson); Everglade, Apr. (A. M. N. H.).

Oecleus borealis Van D. "Abundant at all places, especially towards the southern end of the state" (Van Duzee); Jacksonville, Ormond, Atlantic Beach (Mrs. Slosson) Clearwater, Apr., Sanford, May (A. M. N. H.). Gainesville (C. J. D.).

Myndus delicatus Van D. "Florida" (Van Duzee).

Myndus slossoni Ball. Crescent City (Van Duzee); Biscayne Bay, Charlotte Harbor (Mrs. Slosson); Crescent City, Sanford, Apr. (A. M. N. H.). Gainesville (J. R. W.). St. Petersburg (H. O.)

Myndus enotatus Van D. Crescent City, Apr. (Van Duzee, Mrs. Slosson and A. M. N. H.); Ormond, Charlotte Harbor, Biscayne Bay (Mrs. Slosson); Sanford, Apr. (A. M. N. H.); St. Petersburg (H. O.)

Myndus lunatus Van D. Sanford, Sevenoaks, Ft. Myers, Estero, (Van Duzee).

Myndus pusillus Van D. Crescent City, Sevenoaks (Van Duzee); Ormond, Atlantic Beach, Charlotte Harbor (Mrs. Slosson).

Pelitropis rotulata Van Duz. Ft. Myers, Estero (Van Duzee); Lake Worth, Biscayne Bay (Mrs. Slosson). Gainesville (C. J. D.)

Fitchiella robertsoni (Fitch). Estero (Van Duzee); St. Petersburg (H. O.)

Bruchomorpha pallidipes Stal. Crescent City, Estero (Van Duzee).

Bruchomorpha suturalis Melich. "Common throughout Florida" (Van Duzee); Ft. Myers, Lakeland, Newberry, Nov. (A. M. N. H.).

Bruchomorpha tristis Stal. Crescent City, Estero, Sevenoaks (Van Duzee).

Bruchomorpha jocosa Stal. Crescent City, Sanford, Sevenoaks, St. Petersburg, Tampa, Ft. Myers (Van Duzee); Lakeland, Nov. (A. M. N. H.).

Aphelonema decorata Van D. Crescent City, St. Petersburg (Van Duzee); Charlotte Harbor (Mrs. Slosson).

Hysteropterum punctiferum Walk. Widely distributed and very abundant. Jacksonville (Mrs. Slosson); Clearwater, Sanford, Tampa (A. M. N. H.). Gainesville (C. J. D. J. R. W.). Plentiful.

Thionia simplex Germ. Sevenoaks (Van Duzee); Gainesville (C. J. D. J. R. W.).

Thionia bullata Say. Jacksonville (Mrs. Slosson); Gainesville (C. J. D. J. R. W.).

Acanalonia bivittata (Say). Estero (Van Duzee); Gainesville (C. J. D.).

Acanalonia latifrons (Walk.) Tampa, Ft. Myers, Estero (Van Duzee); St. Augustine (Johnson); Biscayne Bay (Mrs. Slosson); Lakeland (A. M. N. H.). Gainesville (C. J. D. J. R. W.).

Acanalonia pumila (Van D.) Estero Island (Van Duzee); Biscayne Bay (Mrs. Slosson). Cedar Keys, Gainesville (J. R. W.)

Acanalonia conica (Say). Gainesville (C. J. D.).

Acanalonia servillei Spin. "Florida" (Uhler); Gainesville (C. J. D.).

Ormenis proxima (Walk.) "East Florida" (Walker).

Ormenis pruinosa (Say). Sevenoaks, Estero (Van Duzee); Clearwater, Apr. (A. M. N. H.); St. Augustine (Johnson). Gainesville (J. R. W.)

Ormenis rufifascia (Walk.) Ft. Myers, Estero, Clearwater (Van Duzee); LaGrange, Sept. (Sleight); Sanford, Apr. (A. M. N. H.).

Ormenis septentrionalis (Spin.) St. Augustine (Johnson); Gainesville.

Cyarda melichari Van D. "Common everywhere in Florida" (Van Duzee); Sanford, Crescent City, St. Petersburg, Everglade, Tampa, Jacksonville, Newberry, Lakeland, Punta Gorda, Ft. Myers (A. M. N. H.). Gainesville (C. J. D. and J. R. W.). Blandon, New Smyrna, Bradentown (J. R. W.).

Flatoides punctatus (Walk.) "Taken occasionally at all places where I collected in Florida" (Van Duzee); Biscayne Bay, Jacksonville (Mrs. Slosson); Marco, Ft. Myers, Clearwater, Lakeland, Punta Gorda (A. M. N. H.). Gainesville (C. J. D.).

Amalopota fitchii Van D. Gainesville (C. J. D.). Heretofore known as a northern species and recorded only as far south as North Carolina.

Otiocerus abbotti Kirby. Jacksonville (A. M. N. H.). Gainesville (C. J. D.)

Otiocerus degeeri Kirby. Sevenoaks (Van Duzee); Jacksonville (A. M. N. H. and Davis); "Florida" (Uhler). Gainesville (C. J. D.).

Cenchrea fulva Van D. Estero (Van Duzee); Gainesville (J. R. W.). Also from Cuba.

Lamenia obscura Ball. Crescent City, Haw Creek (Van Duzee and A. M. N. H.). Gainesville (C. J. D.).

Copicerus irroratus Schwartz. Biscayne Bay (Mrs. Slosson). Gainesville (C. J. D.).

Stenocranus dorsalis Fitch. Crescent City, Sanford (Van Duzee); Biscayne Bay (Mrs. Slosson); Crescent City (A. M. N. H.).

Stenocranus dorsalis Fitch. var. *lautus* Van Duzee.

Stenocranus palaetus Van D. Crescent City (Van Duzee and A. M. N. H.); Everglade, Apr. (A. M. N. H.).

Stenocranus saccharivorus Westw. Tampa (Van Duzee).

Kelisia parvula Ball. "Florida" (Van Duzee).

Megamelanus elongatus Ball. Crescent City, St. Petersburg, Estero Island (Van Duzee); Belleair, Biscayne Bay, Ormond (Mrs. Slosson).

?*Megamelanus spartini* Osb. St. Petersburg (Van Duzee); Belleair (Mrs. Slosson).

Prokelesia marginata Van D. Estero (Van Duzee); Ormond (Mrs. Slosson).

Megamelus seminigra Stal. "Florida" (Van Duzee).

Macrotomella carinata Van D. Crescent City, Ft. Myers (Van Duzee).

Pissonotus marginatus Van D. Sevenoaks (Van Duzee).

Pissonotus basalis Van D. Ft. Myers, Estero (Van Duzee).

Pissonotus ater Van D. Crescent City, Tampa, Sevenoaks, Ft. Myers (Van Duzee); Titusville, Nov. (A. M. N. H.).

Pissonotus pallipes Van D. "Florida" (Van Duzee).

Pissonotus brunneus Van D. Crescent City (Van Duzee).

Pissonotus delicatus Van D. Sevenoaks, Crescent City, Estero (Van Duzee).

Peregrinus maidis Ashm. Estero (Van Duzee).

Phyllodinus nitens Van D. St. Petersburg, Estero (Van Duzee).

Bostaera nasuta Ball. Tampa, Sevenoaks (Van Duzee); St. Petersburg (H. O.)

Stobaera affinis Van D. Crescent City, Ft. Myers (Van Duzee); Biscayne Bay (Mrs. Slosson).

Stobaera pallida Osb. Ft. Myers, Estero (Van Duzee); Newberry (A. M. N. H.); Nassau (Crawford); Key West (H. O.)

Stobaera quadripustulata Van D. Estero (Van Duzee).

Stobaera concinna Stal. Biscayne Bay, Belleair (Mrs. Slosson); Gainesville (C. J. D.)

Liburniella ornata Stal. Crescent City (Van Duzee).

Liburnia slossoni Ball. Crescent City, Estero (Van Duzee); Biscayne Bay, Belleair, Lake Worth, Ormond (Mrs. Slosson).

Liburnia weedi Van D. Sanford, Crescent City (Van Duzee); Punta Gorda (A. M. N. H.)

Liburnia humilis Van D. Sanford, St. Petersburg (Van Duzee).
Liburnia laminalis Van D. Crescent City (Van Duzee) ; Belleair (Mrs. Slosson).
Liburnia culta Van D. Biscayne Bay (Mrs. Slosson).
Liburnia puella Van D. Crescent City, Sevenoaks (Van Duzee) ; Biscayne Bay, Belleair (Mrs. Slosson).
Liburnia basivitta Van D. Crescent City (Van Duzee) ; Jacksonville (Mrs. Slosson).
Liburnia osborni Van D. Estero (Van Duzee) ; Lakeland (Bradley).
Liburnia detecta Van D. Crescent City, St. Petersburg (Van Duzee) ; Ormond, Biscayne Bay, Lake Worth (Mrs. Slosson) ; Titusville (A. M. N. H.).
Liburnia tuckeri Van D. St. Petersburg (Van Duzee).
Liburnia foveata Van D. Lake Worth (Mrs. Slosson).
Liburnia albolinosa Fowler. Sevenoaks, Estero (Van Duzee) ; Titusville, LaBelle (A. M. N. H.).
Liburnia teapae Fowl. Biscayne Bay (Mrs. Slosson).
Liburnia seminigra Stal. Crescent City, Estero (Van Duzee) ; Miami (A. M. N. H.) ; Belleair, Ormond, (Mrs. Slosson).
Liburnia andromeda Van D. Sevenoaks, Tampa (Van Duzee) ; Lakeland (A. M. N. H.) ; Biscayne Bay, Belleair (Mrs. Slosson).

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A HOST PLANT LIST OF APHIDS IN THE VICINITY OF THE UNIVERSITY OF FLORIDA [1]

By Arthur C. Mason

Our present literature on the insect life of Florida contains very few references to aphids. In fact, only a few species which are of economic importance are even mentioned, and nothing like a list of those occurring in the State has been attempted. While this paper does not contain a complete list of the plant lice of Florida or even this section of the State, still it may serve as a start toward such a list, and may be added to from time to time.

Previous references include *Aphis brassica* on cabbage (31) (32), *Myzus persicae* on peach and tomatoes (26) (36), *Megoura solani* on tomatoes (35) (36), *Aphis gossypii* on cotton, cucurbits, and orange (2) (22) (31) (32), *Siphonophora cucurbitae* on egg-plant (32), *Aphis maidis* on corn (1), and *Toxoptera graminum* on oats (37). These are dealt with purely from an economic standpoint.

Lists of aphids have been written by several entomologists for various sections of the country, but none of them cover Florida. While it is true that a large number of plant lice are widely distributed and found in practically all the states, some others may be restricted to this part of the country alone. Therefore, a complete list for this State should be prepared.

The insects listed were collected over a period of two years

[1] Taken from thesis entitled "Systematic and Biological Studies of Some Florida Aphididae," presented by the writer to the University of Florida in 1915 for the degree of Master of Science.

This paper constitutes Part I exclusive of sections on methods of collecting, mounting, etc. Parts II and III together with references cited will appear in later issues.

(1913-1915) and during all seasons. They represent those found on both cultivated crops and wild plants. The former, of course, are brought to the attention of economic workers much more often because of their importance to agriculture and also their greater abundance. The list represents about 30 species of aphids. Many others collected could not be determined because of lack of mature specimens or winged forms. Undoubtedly there are in the state many undescribed species of plant lice and at least two of these were found.

Permanent mounts were made of all specimens and are in the author's collection. Natural colors cannot be retained in mounted slides and color notes must be made from the live specimens.

HOST PLANT LIST OF APHIDS[1]

Ampelopsis quinquefolia (Virginia creeper)
  Aphis folsomii Davis
Andropogon sorghum var. (sorghum)
  Sipha flava Forbes.
Apple—see *Pyrus malus*
Avena sativa (oats)
  Aphis avena Fitch
  Macrosiphum granaria Buckt.
  Myzus persicae Sulz.
  Toxoptera graminum Rond.
Bean—see *Phaesolus vulgaris*
Beet—see *Beta vulgaris*
Beta vulgaris (beet)
  Myzus persicae Sulz.
Brassica oleraceae (cabbage)
  Aphis brassicae L.
  Aphis pseudobrassicae Paddock
  Myzus persicae Sulz.
Brassica oleraceae var. *acephala* (collards)
  Aphis pseudobrassicae
  Myzus persicae Sulz.
Brassica oleraceae var. *acephala* (kale)
  Myzus persicae Sulz.
Brassica oleraceae var. *botrytis* (cauliflower)
  Myzus persicae Sulz.
B. oleraceae var. *caulo-rapa* (kohl rabi)
  Myzus persicae Sulz.
Brassica rapa (turnip)
  Myzus persicae Sulz.
Cabbage—see *Brassica oleraceae*
Calabash gourd—see *Lagenaria vulgaris*
Capsicum annum (pepper)
  Myzus persicae Sulz.
Carrot—see *Daucus carota*
Cauliflower—see *Brassica oleraceae* var. *botrytis*
Chenopodium viride (Lamb's quarters)
  Myzus persicae Sulz.

[1] Credit for the determinations of many of the aphids listed herein is given to J. J. Davis, Edith M. Patch, and F. B. Paddock.

Chloris gavana (Rhodes grass)	*Macrosiphum sp.*
	Sipha flava Forbes
Chrysanthemum sp. (Chrysanthemum)	
	Macrosiphum sanborni Gill.
Citrullus vulgaris (watermelon)	*Aphis gossypii* Glov.
Citrus aurantium (orange)	*Aphis gossypii* Glov.
	Myzus persicae Sulz.
	Toxoptera aurantii Koch.
Collards—see *Brassica oleraceae* var. *acephala*	
Corn—see *Zea Mays*	
Cotton—see *Gossypium herbaceum*	
Cucumis sativus (cucumber)	*Aphis gossypii* Glov.
Cucumis sp. (musk-melon)	*Aphis gossypii* Glov.
Cucurbita sp. (squash)	*Aphis gossypii* Glov.
Cyperus esculenta (nut grass)	*Carolinaia sp.*
	Sipha flava Forbes.
Daucus carota (carrot)	*Myzus persicae* Sulz.
Easter lily—see *Lillium longiflorum*	
Egg-plant—see *Solanum melongena*	
English ivy—see *Hedera helix*	
Euphorbia pulcherrima (poinsettia)	*Myzus persicae* Sulz.
Gnaphalium spathulatum	*Aphis gossypii Glov.*
	Macrosiphum rudbeckiae Fitch.
	Myzus persicae Sulz.
Gossypium herbaceum (cotton)	*Aphis gossypii* (Reported in Bul. 34, Fla.)
Grape—see *Vitis sp.*	
Grasses	
Andropogon annulatus	
Andropogon barbindoes	
Andropogon halepensis (Johnson grass)	
Andropogon monticela	
Andropogon sericens	
Andropogon sp. (Soudan grass)	
Anthephora hermaphrodita	
Cenchus biflorus	
Chaetochloa flava	
Chaetochloa aurea	
Eleusine coracana	
Eragrostis eurouloa	
Eulalia japonica zebrina	
Melinis multiflora	
Panicum antidoldes	
Panicum maximum	
Panicum hirsutissimum	
Paspalum nodosum	
Paspalum stoleniferum	
Pennisetum glaucum	
Pennisetum spicatum	
Pennisetum typhoideum	

Sorghastrum stipoides	
Syntherisma consanguinea	
Tricholaena rosea (Natal grass)	
Tricholaena wrightii	
	Sipha flava Forbes
Green briar—see *Smilax sp.*	
Hedera helix (English ivy)	*Aphis hederae* Kaltenbach.
	Myzus persicae Sulz.
Helianthus annuus (sunflower)	*Myzus persicae* Sulz.
Hickoria alba	*Phylloxera caryae-scissa* (Reported by Pergande (30)
Hickoria pecan (pecan)	*Phylloxera sp.*
Hickoria sp. (hickory)	*Monellia caryella* Fitch.
	Phylloxera sp.
	Phylloxera sp.
	Phylloxera sp.
Holly—see *Ilex opaca*	
Hybiscus esculentus (okra)	*Myzus persicae* Sulz.
Hybiscus sp. (hybiscus)	*Myzus persicae* Sulz.
Ilex opaca (holly)	*Toxoptera aurantiae* Koch.
Ipomoea pandurata (moonflower)	*Aphis gossypii* Glov.
Ironweed—see *Vernonia angustifolia*	
Kale—see *Brassica oleraceae* var. *acephala*	
Kohl rabi—see *Brassica oleraceae* var. *caulo-rapa*	
Lactuca sativa (lettuce)	*Macrosiphum rudbeckia* Fitch
	Myzus persicae Sulz.
Lagenaria vulgaris (calabash gourd)	*Aphis gossypii* Glov.
Lamb's quarters—see *Chenopodium viride*	
Lettuce—see *Lactuca sativa*	
Lillium longiflorum (Easter lily)	*Aphis gossypii* Glov.
	Myzus persicae Sulz.
Lycopersicum esculentum (tomato)	*Megoura solani* Thomas (Reported Fla. Bul. 125)
	Myzus persicae Sulz.
Moonflower—see *Ipomoea pandurata*	
Musk-melon—see *Cucumis sp.*	
Mustard, black—see *Sinapis nigra*	
Nut grass—see *Cyperus esculenta*	
Oats—see *Avena sativa*	
Okra—see *Hybiscus esculentus*	
Orange—see *Citrus aurantium*	
Pansy—see *Viola tricolor*	
Parsnip—see *Pastinaca sativa*	
Pastinaca sativa (parsnip)	*Myzus persicae* Sulz.
Pea—see *Pisum sativum*	
Peach—see *Prunus persica*	
Pecan—see *Hickoria pecan*	
Pepper—see *Capsicum annum*	
Phaesolus vulgaris (garden bean)	*Myzus persicae* Sulz.
Pine—see *Pinus taeda*	

Pinus taeda (pine)	*Lachnus pini* L.
Pisum sativum (garden pea)	*Macrosiphum pisi* L.
	Myzus persicae Sulz.
Poinsettia—see *Euphorbia pulcherrima*	
Potato—see *Solanum tuberosum*	
Prunus persica (peach)	*Myzus persicae* Sulz.
Pyrus malus (apple)	*Aphis pomi* DeG.
Radish—see *Raphanus sativus*	
Raphanus sativus (radish)	*Myzus persicae* Sulz.
Rhodes grass—see *Chloris gavana*	
Rosa sp. (rose)	*Macrosiphum davisi* Del G.
Rose—see *Rosa sp.*	
Saccharum officinarum (sugar cane)	*Sipha flava* Forbes
Sinapis nigra (black mustard)	*Myzus persicae* Sulz.
Smilax sp. (green briar)	*Pemphigus attenuatus* Osb.
Solanum melongena (egg-plant)	*Myzus persicae* Sulz.
	Siphonophora curcurbitae Middleton. (Reported from Bul. 34, Fla.)
Solanum tuberosum (potato)	*Myzus persicae* Sulz.
Sonchus asper (spiny-leaved sonchus)	*Rhopalosiphum sonchi* Oestlund.
Sonchus oleraceus (sow thistle)	*Rhopalosiphum sonchi* Oestlund.
Sophia pinnata (Tansy mustard)	*Myzus persicae* Sulz.
Sorghum—see *Andropogon sorghum*	
Sow thistle—see *Sonchus oleraceus*	
Squash—see *Cucurbita sp.*	
Stizolobium deeringianum (velvet bean)	*Myzus persicae* Sulz.
Sugar cane—see *Saccharum officinarum*	
Sunflower—see *Helianthus annuus*	
Tansy mustard—see *Sophia pinnata*	
Tomato—see *Lycopersicum esculentum*	
Turnip—see *Brassica rapa*	
Velvet bean—see *Stizolobium deeringianum*	
Vernonia angustifolia (Ironweed)	*Aphis vernoniae* Thos.
Viola tricolor (pansy)	*Myzus persicae* Sulz.
Viola sp. (violet)	*Myzus persicae* Sulz.
Violet—see *Viola sp.*	
Virginia creeper—see *Ampelopsis quinquefolia*	
Vitis sp. (wild grape)	*Macrosiphum viticola* Thos.
Watermelon—see *Citrullus vulgaris*	
Zea Mays (corn)	*Aphis maidis* Fitch (Reported in Fla. Bul. 2)
	Aphis setariae Thos.
	Macrosiphum sp.
	Myzus persicae Sulz.
	Sipha flava Forbes.
	Toxoptera graminum Rond.

MINUTES OF MEETINGS

LANGUAGE HALL, April 25, 1921.

Society called to order 4:30 p. m. President Watson in the chair. The paper of the evening was "Fungus Enemies of the Walnut Aphis," by Dr. O. F. Burger. The paper was very interesting and highly appreciated by all present.

Under Timely Notes, Dr. Montgomery stated that the Pink Boll Worm had been found on four islands of the West Indies.

Mr. Stirling spoke of a new insect that had been reported as doing considerable damage to cotton in Mexico.

J. Chaffin reported considerable damage being caused by orange leaf notcher *(Artipus floridanus)* and Blue Green Citrus Beetle *(Pachnaeus opalus)* to citrus and avocado in vicinity of Little River.

There being no further business, the society adjourned.

J. CHAFFIN, *Secretary.*

DEFERRED MEETING OF JULY 11, 1921

Meeting was called to order at 4:45 by Prof. J. R. Watson, the president, in the chair. Mr. Chamberlain, in charge tobacco insect investigations for the Bur. Ent., U. S. D. A., at Quincy, Fla., was elected to membership.

Prof. Fattig, the vice president of the Society, having left the State permanently, this office was declared vacant by a vote of the Society, and Mr. A. C. Brown elected by acclamation to fill this vacancy.

It was voted to omit the regular July and August meetings and have the next meeting in September.

There were present: J. R. Watson, Geo. B. Merrill, A. H. Beyer, A. C. Brown, J. C. Goodwin, J. H. Montgomery, F. M. O'Byrne, and E. W. Berger.

The paper of the evening was by Mr. A. H. Beyer, Asst. Entomologist at Experiment Station. Subject: *Coccobacillus acridiorum* as a Factor in Locust Control. Mr. Beyer's paper consisted of a discussion of his work on this bacterium while he was in the employ of the U. S. D. A. in 1919. The paper was of great interest and a brief resume by the author is attached to these minutes.

Under Brief and Timely Notes Prof. Watson showed a bagworm and also a large thrips.

The Society adjourned at 6 p. m.

E. W. BERGER, *Secretary pro-tem.*

October 5, 1921.

A special meeting and smoker of the Florida Entomological Society was called to order at 8:30 p. m., President Watson in the chair. Members present: Berger, Briggs, Brown, Burger, Chaffin, DeBusk, Goodwin, Hunt, Merrill, Mason, Newell, Montgomery, Reese and Yothers. Several visitors and speakers of the Citrus Seminar were also present.

The president welcomed the visitors and made a few introductory remarks, after which business was taken up in the regular order. On motion and second E. L. Lord, Assistant Professor of Horticulture in the Agricultural College, was duly elected a member of the society.

Mr. W. W. Yothers of the Bureau of Entomology was called on for a few remarks and he gave a very interesting account of some of the work and experiments he is carrying on at Orlando in the control of citrus insect pests. He spoke of the difficulty of rearing rust mites in confinement and of controlling the Fla. Red Scale *(Chrysomphalus aonidum)*. He stated that he had found a 2% emulsion of a heavy viscid oil satisfactory.

Dr. H. A. Morgan, president of the University of Tennessee, was then called upon. He gave a very humorous and interesting talk on his experiences as an Entomologist in Louisiana twenty or thirty years ago. He also gave a brief account of his work in distributing a parasite of the Harlequin Cabbage bug and his efforts in helping secure the first Government appropriation for the eradication of the cattle tick.

Mr. Neal F. Howard of the Bureau of Entomology next gave some interesting facts in regard to the Mexican bean beetle situation in Alabama and Georgia.

On motion of Dr. J. H. Montgomery, the Society passed the following resolution:

"Whereas, the attention of the Society has been directed to work done by Dr. A. T. Speare of the Bureau of Entomology in connection with fungi preying upon mealybugs and rust mites, and

"Whereas, the results so far obtained are extremely promising and indicate that a natural control of these pests may be found to be of practical value, and

"Whereas, in the opinion of the Society, this work should be prosecuted vigorously and without interruption,

"Therefore, Be it resolved by the Florida Entomological So-

(Continued on page 30)

The

FLORIDA ENTOMOLOGIST

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PROFESSOR J. R. WATSON .... *Editor*
DR. WILMON NEWELL .... *Associate Editor*
DR. E. W. BERGER .... *Business Manager*

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ENTOMOLOGICAL PAPERS AT THE CITRUS SEMINAR

On Oct. 5 Mr. W. W. Yothers read a paper on "Some Fundamentals of Grove Pest Control." He stated that there are three possible viewpoints: (1) To do nothing, leaving the control of the pests to their natural enemies. (2) To take such measures as will reduce their numbers to the point of commercial control. This will necessitate frequent repetitions of the control measures. (3) To eradicate the pest—expensive in the first costs but perhaps often cheapest in the end. Which method should be pursued will depend upon the insect. Or a combination of the methods will often be most practical.

Mr. Yothers also read a very valuable paper by Dr. A. T. Speare of the U. S. Bur. of Ent., founded on work done in Mr. Yothers' laboratory at Orlando. It has long been a matter of common observation that the citrus rust mites and mealy bugs tend to disappear with the advent of the rainy season. It has been generally supposed that this was due to their being washed off by the heavy rains. But according to Dr. Speare the true cause is the rapid development of two fungi under the influence of the high humidity of the rainy season. The fungus which infects the rust mites is a species of *Cordiceps*. Infected rust mites may be recognized by their shrunken appearance and of course absence of movement. The fungus which attacks the mealy bugs is an undescribed species of *Entomophora*. Infested mealy bugs may be recognized by their soft spongy texture. Under a sharp knife they can be cut like cheese.

These discoveries are not only of great scientific interest but of equal practical importance. If a grower finds that one of these fungi is rapidly developing in his grove, under suitable weather conditions he may often safely leave the control of the pest to the fungus, and save the cost of spraying.

Another paper on entomogenous fungi was read by Dr. E. W. Berger, who gave a brief account of his growing, in pure cultures, of two fungi hitherto not so grown and of his discovery of a new strain of the Red Whitefly-Fungus.

The new fungi are *Aschersonia goldiana* on Cloudy-winged Whitefly from Cuba (specimens received at the Experiment Station) and on an unknown aleyrodid from Winter Park, Florida; and the Cuban Aschersonia found infecting the Pyriform Scale, and Liriodendron Scale in Florida, and the Tessellated Scale in Porto Rico.

The new strain of the Red Whitefly-Fungus was discovered on some holly and bay leaves sent in from a hammock at Winter Park, Fla. It fruits freely in the culture bottles during summer, a fact which has not been true for the other strains heretofore grown. This fact will make it possible to grow it in smaller quantities during summer as needed, thus always assuring a fresher product than heretofore when the whole crop had to be grown in late winter and early spring and kept in cold storage. Indications are that it is also an unusually virile strain.

Prof. J. R. Watson presented the results of some recent experiments on spraying for thrips. He exhibited a table giving the results of spraying to lessen thrip marks on fruit. This covered the results in seven groves from Lake to St. Lucie counties. In groves where the thrips averaged from 25 to 64 per bloom, about half of the unsprayed fruit was marked to such an extent as to lower its grade from brights to goldens if otherwise perfect. 38% of this scarring was prevented by a single spraying. This repaid the cost of spraying many times over. Groves in which the thrips averaged 10 per bloom did not repay the cost of spraying for thrips alone. But where they were being sprayed at blossoming time for rust mite or scab the additional cost of adding ¾ pt. of Black Leaf 40 per 100 gallons was repaid twice over.

The proper time to spray is when the trees are in full bloom, and the proper solution at least 1 pt. of Black Leaf 40 to 100 gallons of the rust mite spray solution.

Mr. Neal F. Howard gave an interesting account of the Mexican Bean Beetle investigations of the Bur. of Entomology, U. S. D. A., in Alabama, Georgia and Tennessee. There appears to be no hope of stopping the beetles and growers of legumes will have to plan substituting other crops and immune species. Fortunately, the velvet bean, both bush varieties and climber, are immune, except that the adult beetles do feed some upon them, so that this bean may have to be substituted as a cover crop and forage in place of cow peas and beggar weed. Snap beans appear doomed. The use of poisons in its control have proved unsatisfactory. Investigations in Mexico, in search of natural enemies, have so far been fruitless.

Mr. Chaffin read a paper on mealy bugs. This is printed elsewhere in this journal.

MINUTES OF MEETINGS

(Continued from page 27)

ciety, in special session at Gainesville October 5, 1921, that Dr. Speare be congratulated upon the success which has so far attended his efforts, and

"Further, That the Secretary of the Society communicate with the Chief of Bureau of Entomology expressing the hope of the Society that Dr. Speare will be assigned to further investigational work in Florida to the end that this work be completed."

There being no further business, the Society adjourned.

J. CHAFFIN, *Secretary.*

PERSONALS

Among our out of town members present at the Citrus Seminar were W. W. Yothers and A. C. Mason of the U. S. Ent. Lab. at Orlando; E. F. DeBusk, County Agent of Lake; W. R. Briggs, Agent for Manatee County; Mr. Seth Walker of the Citrus Exchange; Mr. K. E. Bragdon, formerly County Agent of Brevard but now Field Agent with the Citrus Exchange Supply Co.; and Mr. C. M. Hunt, Assistant Nursery Inspector.

Miss Evelyn Osborn, formerly Assistant in Entomology in the Experiment Station, was on Aug. 27 married to Mr. Chas. M. Knapp of Syracuse, N. Y.

Prof. Carl J. Drake received the degree of Ph. D. from Ohio State University in June. He has been spending the summer in Mississippi, Arizona, and California.

W. S. Blatchley received the degree of LL. D. from the University of Indiana in June. Dr. Blatchley is one of less than a dozen to receive this degree from Indiana University. He expects to return to his winter home in Dunedin shortly.

The stork has recently visited the homes of two of our members, Mr. Geo. Merrill and Mr. W. W. Yothers. Both girls.

Mr. P. W. Fattig is now teaching biology in the State Normal School at Farmville, Va.

MEALYBUGS

By JEFF CHAFIN

Mealybugs are one of the most widely distributed group of insects known; they occur in practically every country in the world and attack nearly every cultivated and wild plant. If it were not for the fact that they have a large number of natural enemies they would no doubt do serious damage to many of our most valuable crops. They seem to thrive best and do the most damage in tropical and subtropical climates. We probably have forty or fifty different species in this State, but of that number there are only three or four that do very much damage. However, many of the most injurious species have not been introduced into Florida.

One species that we do not have does serious damage to sugar cane in Cuba. California has two species that do considerable damage: Baker's mealybug which attacks the grape, and the citrophilus mealybug which prefers citrus. They have made several unsuccessful efforts to control and eradicate these pests. These two species are probably the most injurious mealybugs in the United States and neither of them is present in Florida at the present time. There are no doubt many other species in the United States, as well as in the tropical countries, that would do serious damage if brought to this State.

The mealybug that does the most damage in Florida at the present time is the Common Citrus Mealybug *(Pseudococcus citri)* which is a serious pest in our ornamental nurseries and greenhouses and sometimes becomes very numerous in citrus groves during dry seasons. During the dry spell last summer they did more damage than usual all over the citrus belt. This particular species is present all over the United States but it seems to do the most damage here. We do not hear of it causing any damage in California, so either their climatic conditions are unfavorable for it or they have some natural enemy that we do not have.

The next of importance is the Cocoanut Mealybug *(P. nipae)* which is always present on trees and ornamentals in the southern part of this State. During the dry spell last summer the avocados, mangoes, sapodillas, palms, many other ornamental plants in Fort Myers were covered with this insect. The sooty mold, growing on the honey dew excreted by the pest, made a very unsightly appearance and, of course, the fruit and plants were damaged. This species apparently does not have as many natural enemies as the common citrus mealybug and is just as hard if not harder to control.

Another species that is beginning to play an important part is the Pineapple Mealybug *(P. bromeliae)* which did quite a bit of damage to several pineapple plantings down the east coast this year. This pest prefers the pineapple and was probably brought to this State several years ago on imported pineapple slips.

The life cycle of a mealybug is short and a female will lay from three to five hundred eggs; so if conditions are favorable it takes only a short time for them to become very numerous regardless of the fact that they have a large number of natural enemies. They have insect friends that protect them and aid in their multiplication. Several species of ants will carry the young mealybugs around and protect them in order that they may secure the honeydew secreted by the pest. The most active ant along this line is the Argentine ant, which we do not have in this State at the present time.

Owing to the large number of host plants, rotation of crops would do very little good in the control of mealybugs. Some of the most important natural enemies are some hymenopterous parasites, lady beetles and the larvae of syrphid and lace-wing flies.

Mealybugs are covered with a wax-like secretion and the eggs are deposited in a mass of this material, so spraying with a strong insecticide has very little effect. When the rainy season begins, the severe infestations disappear, so spraying with clear water under high pressure to wash the insects from the tree has been recommended by the best Entomologists for years, but anyone who has had much experience spraying for mealybugs knows that any kind of solution or pressure gives very poor results.

Quite recently one of the field men of the Bureau of Entomology discovered an unnoticeable fungus attacking the mealybug and when the rainy season began this year this fungus completely destroyed the severe infestations in several groves that he had under observation. Personally, I believe their disappearance during rainy weather is due to this fungus rather than the rain. If this is the case, our problem is to induce this fungus to thrive during dry weather or find some parasite that will hold the mealybug in check until the rainy season begins.

IT PAYS TO CONTROL RUST MITE

J. G. GROSSENBACHER

Strange to say, the rust mite is not an insect but is more closely related to spiders. It is a near kin of the itch mite, "red bugs," red spiders, and cattle ticks. It feeds on all new green growth of trees: leaves, fruit and twigs. It seems to live on juices taken from trees, particularly the oil. However, if these mites consumed all the oil from the glands they open we would have no real rusty fruit. In fact, the rusty appearance of fruit, leaves and twigs is due to the oil oozing from glands that had been tapped by the mites. The oil flowing from the punctured glands spreads out more or less over the rind of the fruit and during nights of heavy dew or light showers may run down the sides of the fruit in narrow bands; the exposure of these thin layers of oil to the air causes the oil to break down or oxidize and change to a dark color, thus resulting in rust and where it had run down the fruit in streaks to "tearstaining."

There is another effect that the exuding oil has on young fruit and other newly developed parts of trees that should be mentioned in this connection. In 1914 and 1915, I punctured a large number of oil glands on newly hardened young twigs and half-grown oranges with a very fine pointed needle under a lens. The punctured areas were marked and kept under observation during some weeks. Small amounts of oil escaped from each pricked oil sack and spread over tiny spots and areas, the shape of which depended upon the action of gravity on the escaping oil. After a few days the distribution of the oil was definitely and clearly shown by brown spots of the exact size and shape of the oil-covered area. In order to make a further test of the effects of orange oil on the epidermal tissues of fruit, leaves and twigs of orange and grapefruit, a small quantity of this oil was obtained and applied with an atomizer so as to cover the surface with tiny spots of oil; in other cases the application was continued until the oil spots became so numerous and close together that they eventually touched and thus covered considerable areas completely with a continuous film of orange oil. The result was interesting in that in case of the light applications every point, formerly occupied by oil-dust particles delivered by the atomizer, was shown by a tiny brown spot. Where the applications had been so heavy that considerable areas were covered with a continuous film, these areas showed up of the same size and shape as brown blotches. On closer examination the outer skin of these oil covered spots was found to have been killed, leaving a rough outer surface consisting of broken, dead skin tissue adhering to an imperfect substitution skin underneath. In a few cases of extra heavy application of orange oil the entire bark was killed to the wood on twigs as large as a lead pencil, thus resulting in the death of the twigs.

In making these tests with needle pricks and atomizer, I was trying out a suspicion that melanose and ammoniation spots may be due to the bursting of oil glands and the consequent exudation of their contents to the outer surface where the effect of the oil would damage the epidermal layer or outer skin of newly grown leaves, fruit, and twigs. It is evident that the oil is a factor in the development of melanose and ammoniation or dieback spots but the reasons for the escape of the oil from the sacks to the outside must be found before a full explanation can be given. In case of the disease known as melanose it appears that probably abortive infections from spores of the stem-end-rot fungus permit the leakage of the oil and thus result in melanose spots.

Coming back now to the appearance we call rust, one need only examine a very rusty orange that had an early infection, with a hand lens, to see that the outer skin has been killed and that its broken fragments are adhering to an imperfect inner one. This is true only of russeting that is due to an early attack of rust mites on fruit. In case rust mite does not become very numerous until after the fruit has attained considerable size, however, the oil injury following is not so serious and usually gives rise to smooth russets. The rough russets due to the early attacks of rust mites are commonly called buck-skin or shark-skin fruits.

The effects, then, of rust mite on fruit are considerable and various, depending upon the relative earliness and intensity of the infestation and on the weather conditions prevailing during the period of greatest activity. For example, tear-staining can probably result only during periods of comparatively dry weather so that the exuded oil accumulating in spots of intense mite activity may be carried down the sides of fruit in streaks by dew deposits thus allowing concentrated action of the oil, while rains probably dilute the oil to such a degree and wash it off so quickly that no discoloration can result in streaks. Again, a comparatively late attack of the mite will result only in smooth russets and practically no buck-skin effects. In any case, however, it is evident to everyone who observes the presence and activities of the enormous numbers of mites on heavily infested trees that the devitalizing effects of this pest on trees must be more in proportion to their numbers than to their size.

The immediate and most striking loss to growers due to the unhindered development of rust mites in bearing groves is of two kinds: the discoloration of the rind of fruit, and stunting effect on the fruit growth occasioned by the injuries on the rind. The devitalizing effects on trees necessarily also affects fruit size but probably tells heavier on the performance of trees the following season.

(Excerpt from Citrus Leaf No. 7, published May 1, 1921, by the Florida Insecticide Company, Apopka, Florida.)

The negro caretaker of the Reid Bryan nursery reports that he has sprayed every month with "miserable oil." Some of it is, we'll say!

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ON SOME NORTH AND SOUTH AMERICAN TINGIDAE (HEMIP.)*

By Carl J. Drake

Corythucha baccharidis n. sp.

Antennae clothed with a few long hairs. Rostrum reaching almost to the end of the rostral sulcus. Pronotum with the lateral carinae short, curved, strongly raised, each composed of two cells and terminating about equidistant from the hood and median carina; median carina strongly elevated anteriorly, rather short, not quite half as long as the hood, its height a little more than half its length, composed of five or six cells (two rows anteriorly). Paranota with the reticulations smaller than those of the hood, the outer margins armed with a double row of spines (extra submarginal row as in *C. mcelfreshi*). Hood prominent, broad, moderately elevated, slightly constricted at the middle, not strongly narrowed anteriorly, slightly broader than high, the width about seven-tenths of the length. Costal margins of the elytra slightly incurved or nearly straight, the spines moderately long and extending to the basal third. Tumid elevations of elytra large and rounded; costal area largely triseriate (two to three rows of areolae). Length (male), 4.1 mm.; width, 2.8 mm. The female is a little larger and broader than the male.

General color yellowish white, the fuscous markings more prominent than in *C. mcelfreshi*. Most of the nervelets of the hood, save sides of anterior portion, a large spot on median carina, a spot on the tumid elevation, part of sutural area, and the basal and apical cross-bands of elytra fuscous. The apical band has a rather broad hyaline streak and forms almost a double cross-band. Areolae hyaline, partly clouded in the fuscous areas. Body beneath dark reddish brown or black.

Several specimens, collected on *Baccharis* sp. at Paradise Keys, Fla., Feb., by Dr. E. A. Schwarz; one specimen, Miami, Fla., Aug. 2, 1902, by Mr. Russell. *Type* (male, Nat. Mus., No. 25,183), Paradise Keys, Feb. 19, E. A. Schwarz. The *paratypes*

*Contributions from the Department of Entomology, New York State College of Forestry, Syracuse University, Syracuse, N. Y., No. 37.

show considerable variation in color. In general appearance and color, the species closely resembles *C. mcelfreshi* Drake (*type* and 3 other specimens before me), but readily separated from it by the much shorter lateral carinae, less constricted hood, larger tumid elevation of the elytra, shorter median carina and triangular process of pronotum, and the more prominent color markings.

Leptostyla malpigheae n. sp.

Akin to *L. tumida* Champion, but easily distinguished by its much smaller and less elevated hood and the median carina. Length, 3.91 mm.; width, 1.85 mm.

Antennae long and slender; first segment a little longer than the fourth and almost three and a half times the length of the second; third segment long, three and two-thirds times the length of the fourth. Head with five rather long slender spines, the anterior spines (especially median) usually longer than the latero-posterior ones. Rostrum reaching almost to the end of rostral sulcus, the rostral laminae strongly elevated. Hood moderately large, very much smaller than in *tumida;* the anterior margin of head, the tips of the spines and the entire triangular portion of pronotum not concealed by the hood; the length almost three times its height. Median carina slightly shorter than hood and almost as highly elevated, the length a little greater than its height, strongly and angularly raised slightly in front of the middle (two to three rows of cells). Lateral carinae very short, each composed of a long triangular cell. Paranota greatly dilated, recurved and rounded, with four rows of areolae at widest part; the areolae large. Elytra moderately elongate, narrow at the base, widening distally, very similar to *tumida;* costal area with one row of areolae at the base, increasing to three or four at the middle, the areolae large; subcostal area mostly biseriate, usually one row at the base, discoidal area short, rather broad, with three rows of areolae, the anterior side more strongly raised.

General color testaceous, the areolae iridescent and hyaline. Median spine on the head, a spot on median carina, and an oblique fascia, slightly rounded and occupying two depressed rows of areolae on elytra, fuscous. Marginal nervures of paranota and some of the nervelets along the margin of costal area fuscous. Legs and antennae testaceous, the tips of tarsi and (usually) inner side of first antennal segment infuscated.

Many nymphs and several adults, taken on *Malpigea urens* Linn. at San Diego de los Bano, Pinar del Rio, Cuba, by Johnston Ballon, March 27, 1921. *Type* (male) No. 25,184 U. S. N. M. This insect is also somewhat allied to *L. mcelfreshi* Drake from Hayti, but the latter is much larger, and differs greatly in the structure of the hood, paranota, carinae and elytra.

Megalocysta championi n. sp.

Readily separated from *M. pellucida* Champion by its much smaller, less elevated hood (not covering any part of triangular process), broader paranota and well developed carinae. Length, 6.57 mm.; width, 3.7 mm.

Antennae rather long, the third segment three and a half times the length of the fourth. Pronotum tricarinate, the lateral and median carinae well developed, the former diverging posteriorly. Paranota moderately wide, rounded, biseriate, the areolae rather large. Bucculae not contiguous in front. Hood moderately large, not covering the anterior portion of the head nor any part of the triangular process of pronotum, the length about twice its height, the areolae very large and irregular. Elytra faintly constricted a little beyond the middle, broadly rounded at the tips; costal area from three to four seriate at the widest part, the areolae large and irregularly arranged; subcostal area mostly triseriate, the discoidal area raised, with four rows of areolae at widest part, the areolae about equal in size to those of subcostal area. The nervures of hood, paranota and elytra are large and much coarser than in *pellucida*.

General color yellowish brown, with a few fuscous markings. Areolae of hood fuscous, non-transparent. Legs and antennae yellowish brown, the tips of tarsi and apical segments of the latter dark fuscous. Paranota and elytra with the areolae mostly hyaline (a few cells near the apex of the elytra partly clouded), some of the nervelets partly fuscous. Body beneath dark yellowish brown.

One specimen, a female, from Brazil. *Type* in my collection. This species somewhat modifies the generic description of *Megalocysta* Champion, the bucculae being either closed *(pellucida)* or open *(championi)*. The lateral carina, omitted in the original description, are only slightly developed and are entirely covered by the hood. Specimens of *pellucida* from Panama (collected by Dr. E. A. Schwarz) differ from the original description, and a cotype before me, in having the paranota partly biseriate and lateral carinae slightly more developed. Named in honor of Dr. G. C. Champion, who founded the genus.

Galeatus schwarzi n. sp. (Fig. 1)

Very distinct and readily separated from *G. peckhami* Ashm. by its much smaller size, the much larger hood and more strongly inflated posterior triangular portion of pronotum and differently formed paranota. Length, 2.95 mm.; width, 1.22 mm.

Head armed with long, rather stout, blunt spines; two anterior spines, one on each side of median line porrect or with the tips more or less converging; median and latero-posterior spines appressed closely to the head. Antennae slender, rather long, the first segment about twice the length of the second; third segment slightly curved, one and a half times the length of fourth, the latter clothed with numerous fine hairs. Rostrum reaching to the end of rostral sulcus. Pronotum smooth, slightly shining, not very closely punctured, tricarinate; lateral carinae very short, each composed of a single, flap-like cell; median carina very strongly foliaceous, short, about half as long as the head, connected with the median nervure of the latter near the middle and extending upward to join the median nervure of the inflated posterior portion of pronotum near the crest, composed of two long cells, the anterior cell very narrow. Hood large, the greatest height, length and width about equal, extending a little in front of the head, with a distinctly impressed area in front, the areolae large and minutely sculptured. Inflated posterior portion of pronotum large, about as high as the hood, the areolae large and minutely sculptured. Paranota strongly reflexed, short, its height noticeably less than that of the hood, composed of four very wide and short areolae and one long narrow areola in front of the others. Elytra much longer than the pronotum, slightly constricted beyond the middle, the areolae very large; costal area uniseriate, with an extra triangular cell at the constriction, subcostal area uniseriate. Wing considerably longer than the abdomen.

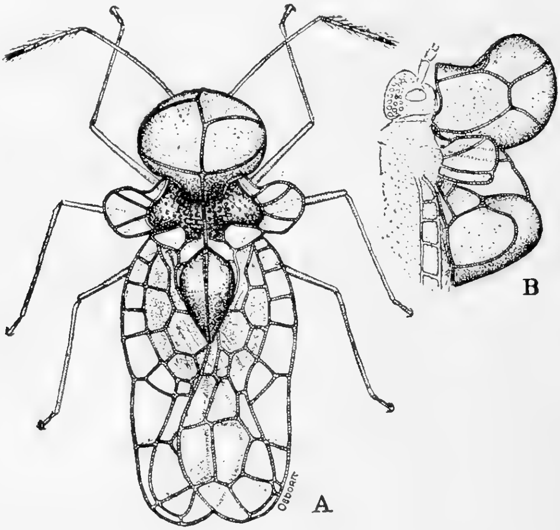

Fig. 1—*Galeatus Schwarzi* Drake.

General color fuscous-brown. Nervures of lacy portions brown and somewhat infuscated, some of the areolae slightly smoky and cloudy. Legs and antennae lighter, the tip of the latter fuscous.

Two females and a male, collected at Paraiso, Canal Zone, Panama, Jan. 21, 22 and 23, 1911, by Dr. E. A. Schwarz. The specimens are all macropterous; *type* (female, Jan. 23) No. 25,151 U. S. N. M. This species has the general appearance of *Dicysta* Champ. but the very large cell readily distinguishes it from the members of that genus.

Gargaphia mexicana n. sp.

Differing from *G. amorphae* Walsh and *G. tiliae* Walsh in the angularly expanded paranota, the somewhat cone-shaped hood and the more strongly raised point (occupying two cells a little in front of the middle) of the median carina. Length, 4.15 mm.; width, 2 mm.

Antennae long, clothed with numerous long hairs; first segment two and a half times as long as the second; third segment very slender, two and a third times as long as the fourth, the latter a little longer than the first and second conjoined. Rostrum reaching almost to the end of rostral sulcus, the rostral laminae strongly elevated. Paranota angularly expanded, with four rows of areolae at its widest part. Hood somewhat conical, moderately elevated. Carinae rather strongly elevated, each composed of a single row of rather large areolae; median carina with a strongly raised arched place a little in front of the middle (much more so than in *tiliae* or *amorphae*). Costal area of the elytra with four rows of areolae at the widest place; subcostal area biseriate; discoidal area with four rows of areolae at widest part, not quite so broadly expanded at the apex as in *amorphae*. Paranota, carinae, pronotum moderately hairy. Basal portion of elytra sparsely hairy.

Antennae and legs brownish, the tarsi and fourth antennal segments black. Head and eyes black, the spines brown or testaceous. Thorax beneath black, the rostral laminae and bucculae yellowish brown. Abdomen beneath reddish brown to nearly black. Hood, carinae and elytra testaceous, four or five oblique nervures of the latter and a small spical spot in discoidal area brown or fuscous. Pronotum blackish.

One female and three male specimens, taken at Tampico (xii-5) and Tamos (xii-7-09) Mexico, by F. C. Bishop. *Type* No. 25,187 U. S. N. M. (female) from Tampico, Mexico.

Gargaphia tiliae Walsh

This species is identical with *G. fasciata* Stal from Illinois. Gibson, Trans. Amer. Ent. Soc., XLV, 1919, p. 191,196, has erroneously treated *fasciata* Stal (specimens from Alabama det. *fasciata* by Champion) and the latter cannot be given specific rank. *Tiliae* is a rather variable species in size, length of spines on the head and color of elytra. In many specimens there is no darkening of the nervures (forming a transverse fascia) of the elytra. The costal and subcostal areas are variable in size and number of rows of areolae.

Gargaphia munda Stal

This is a common and widely distributed species in South America. *Leptostyla lineifera* Walker (*fide* Blair of British Museum) is a synonym of *munda*. *G. magna* Gibson is a very closely related species.

Gargaphia condensa Gibson

G. condensa Gibson and *G. carinata* Gibson are identical and were described from the same series of specimens from Santa Rita Mountains, Arizona. *Condensa* is very closely related to *G. iridenscens* Champion.

Acanthocheila kahavalu Kirkaldy

In the Kirkaldy Collection, National Museum, Washington, D. C., there is one example of this insect from Challanga, Peru, labeled "*type*" and I designate this specimen as the *type* (Nat. Mus. No. 25,152) of the species. I have also examined the following specimens from Bolivia; two from Cochabamba, one from Marcapata and three from Pachitea.

Leptodictya leinahoni Kirkaldy

The genus *Hanuala* of Kirkaldy, Bull. Soc. Ent., France, 1905, p. 216, is identical with the genus *Leptodictya* of Stal and, as the latter has priority, *leinahoni* should be transferred to this genus. In the Kirkaldy Collection (Nat. Mus.) there is a single specimen from Mapiri, Bolivia, labeled "*type*", which I designate as the type (No. 25,062 U. S. N. M.) of the species. I have also examined specimens from Peru (Cozoo, Coll. Gay) and Bolivia (two from Mapiri, one from Lopax (Yungas), and ten from Cochabamba).

Acvsta brasiliensis n. sp.

Very distinct and distinguished at once from the known species of the genus by the biseriate costal area and the very narrow carina-like paranota. The head is armed with five spines, the antero-lateral ones short and projecting forward. Length, 4.3 mm.; width, 2.1 mm.

Antennae slender, rather long, the third segment two and a half times the length of the fourth. Rostrum reaching to the meso-metasternal suture. Head short, very sparsely pubescent. Pronotum coarsely punctured, narrowed anteriorly, moderately clothed with rather long, fine pubescence, tricarinate, the lateral carinae present only on the posterior portion of the pronotum, the median carina very distinct and prominent. Paranota very narrow, extending along the entire margin of pronotum, composed of a single row of very tiny areolae, the posterior two or three cells a little larger than the others. Elytra very sparsely and finely pubescent, considerably longer than the abdomen, each elytron with two raised prominent laterally compressed, point-like structures; costal area uniformly biseriate, the areolae rather large and mostly pentagonal; subcostal area with four rows of areolae; discoidal area very distinct, with four to five rows of areolae at its widest part, and areolae of discoidal and subcostal areas small and subequal in size; sutural area broad, the areolae becoming larger distally. Wings a little longer than the abdomen. Male claspers large and strongly curved.

Color: Head black, the spines testaceous. Eyes reddish or black. Antennae testaceous, the spical segment fuscous. Pronotum dark brown, the paranota, collum and posterior portion of triangular process, and the median carina, except central portion, testaceous. Elytra testaceous, the four prominent raised point-like structures brown with fuscous tips, a large spot in discoidal area, and a slightly smaller one (just opposite) in subcostal area, brown. These two spots, formed by embrowned nervures, form an irregular transverse fascia, extending from the costal area to the inner margin of discoidal area thru the raised point-like protuberance. Body beneath dark brown or blackish, the abdomen more or less tinged with red.

Type (female) No. 25,185 U. S. N. M. from Para, Brazil, collected by C. F. Baker. Some of the paratypes have the paranota, lateral carinae and most of the median carinae dark brown like the pronotum. One specimen has the subcostal area composed largely of four rows of areolae instead of three.

Leptoypha morrisoni n. sp.

Somewhat akin to *L. binotata* Champ., but readily separated from it and from allied forms occurring in the United States by the narrow, uniseriate subcostal area; the costal area is extremely narrow and strongly reflexed, carina-like, the areolae very tiny and mostly indistinct.

Elongate and narrow. Head smooth, somewhat shining, the latero-posterior spines short and the three anterior spines wanting. Rostrum reaching a little beyond the meso-metasternal suture. Antennae rather long, moderately stout; first segment a little shorter and slightly thicker than the second, the latter slightly enlarged towards the tip; third segment slightly curved, almost two and one-third times as long as the fourth, the latter slightly more than twice as long as the first and second conjoined. Pronotum rather coarsely punctured, the lateral carinae wanting, the median carina distinct but only faintly raised. Elytra elongate, widest at a little beyond the base, faintly constricted beyond the middle; discoidal area broad, with about eight or nine rows of areolae at its widest part, the areolae of subcostal and discoidal areas about equal in size; sutural area broad, the areolae becoming larger distally. The pronotum (except disc), especially the posterior triangular portion, moderately and finely pubescent, the pubescence on the elytra rather sparse.

General color brownish. Antennae brown, the first, second and distal two-thirds of fourth segments infuscated. Pronotum reddish brown, the collum and apex of triangular process lighter, the deeply impressed calli black. Elytra brown or yellowish brown, with numerous veins in sutural area, and usually a large spot near the middle and another smaller one near the apex of discoidal area fuscous. Eyes reddish or black. Body beneath dark brown or blackish, sometimes slightly tinged with red.

Length (male) 3.11 mm.; width 1.05 mm. The female is more robust, larger, and the fuscous markings are not as prominent. Described from 3 males and one female, the latter with the head wanting.

San Pedro de Macoris, Rep. Dom., W. I., collected July 15, 1917, by Mr. Harold Morrison. *Type* (male) No. 25,150 U. S. N. M. This species is named in honor of Mr. Harold Morrison, who has

(Continued on page 48)

The
FLORIDA ENTOMOLOGIST

Official Organ of The Florida Entomological Society, Gainesville, Florida.

PROFESSOR J. R. WATSON...*Editor*
DR. WILMON NEWELL..*Associate Editor*
DR. E. W. BERGER..*Business Manager*

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"LITTLE GATEWAYS TO SCIENCE."—We trust that all who have received the previous issue of the *Entomologist* have ordered copies of "Hexapod Stories" and "Bird Stories," published by the Atlantic Monthly Press, Boston, Mass. The author of these two books, Miss Edith M. Patch, is one of only a few lady entomologists in America and we are glad to advertise her books. We hope that the membership of the Florida Entomological Society and subscribers to the *Entomologist* will respond heartily. Prices, postpaid, are 90 cents and $1.00, respectively.

THE TORONTO MEETING.—The editor has just returned from the meeting of the Am. Ass. for the Advancement of Science at Toronto. Meeting with the Association, as usual, were the American Entomological Society and the Am. Association of Economic Entomologists. Some papers on entomological subjects were read at the meetings of the Ecological Society of America which also held one joint meeting with the entomologists as did also the phytopathologists. The meeting was quite successful, over 1800 being in attendance, and favored with very mild weather. Other members of our Society in attendance were Prof. Herbert Osborn, H. L. Dozier of Ohio State and Dr. Carl J. Drake of Syracuse, N. Y., and Mr. C. S. Weigel of U. S. Bureau of Ent. Another former Floridian met was Dr. Sherbakoff of the Tennessee station.

The Entomologists' dinner on Friday evening was a particularly enjoyable affair. As Toronto was the birthplace and 1921 the 32d anniversary of the formation of the Association of Economic Entomologists the addresses were largely of a reminiscent nature. The circumstances of the founding of the Association were recounted by some of the "old imagoes" for the benefit of the "second instar nymphs." A "nymph," a lepidopterist, was heard to observe that some of the "imagoes" seemed to be badly rubbed.

As retiring president of the A. A. A. S. Dr. Howard on Tuesday evening gave a stimulating address on the "War Against Insects." His theme was that insects were struggling with man for the mastery of the earth and that it behooved man to be on the alert lest the issue of the war be against him. His address has been printed in Science. Prof. Wm. Bateson of England lectured to the Association on Wednesday evening. He took the position that while the principle of evolution was thoroly established there was still much doubt as to the factors responsible for the origin of species and that Darwin's theory of the origin of species thru natural selection of small fluctuating variations had not been proven. Along this same line the zoologists had much to say about orthogenesis.

The address of the retiring president of the Economic entomologist, Prof. Geo. A. Dean, was on the subject of cooperation. Prof. Sanders of Pa. was elected president for the Boston meeting next year. It was voted to hold the 1923 meeting in Cincinnati and the 1924 meeting in Washington. For the 1925 meeting a western city, "perhaps Kansas City," was suggested. Space forbids our noting the many interesting and valuable papers presented. One was a highly amusing moving picture of the life history of the ox warbles. This film is owned by the U. S. D. A. and perhaps could be secured by our county agents.

DUSTING GROVES AT THE RATE OF SIX ACRES PER MINUTE

Houser Outflies County Agent Briggs

A very interesting and suggestive illustrated paper was given at the Toronto meeting by Prof. Houser of the Ohio station on the successful dusting with lead arsenate from an aeroplane of a grove of catalpa trees infested with the catalpa sphynx. It was Prof. Houser's contention that, considering the rapidity of the work, dusting tall trees from an aeroplane might under some circumstances prove to be the cheapest method in spite of the high cost of aeroplanes.

How about dusting groves of seedling orange trees for rust mites? One plane might take care of most of the groves of the Citrus Exchange for instance. One member remarked that entomologists must now substitute for their time-honored slogan adopted from the ministry "Let us spray," one adopted from the housewife, "Get up and dust."

MYCODIPLOSIS MOZNETTEI n. sp.

By E. P. Felt, Albany, N. Y.

The small midges described below were received from Mr. G. F. Moznette of the Federal Bureau of Entomology accompanied by the statement that they were reared from the pyriform scale, *Pulvinaria pyriformis* Ckll., as many as three individuals being reared from one scale insect. The larvae devour the eggs of the female scale and when full grown construct small cocoons underneath the scale of the host. One slide containing a number of females was labelled Miami, Fla., November 26, 1921, G. F. Moznette, Avocado. The other slide bears the date of December 2, 1921, and similar information.

The species appears to be closely related to three other predaceous forms in this genus, namely, *M. acarivora* Felt, *M. coccidivora* Felt and *M. pulvinariae* Felt, from all of which it is easily separated by the distinctly shorter stems of the male flagellate antennal segments.

Male: Length 1.25 mm. Antennae a little longer than the body, thickly haired, probably yellowish brown, 14 segments, the fifth with the stems each with a length one half greater than the diameter, terminal segment, basal enlargement roundly disk shape, the basal portion of the stem short, the distal enlargement broad, broadly rounded, obtuse apically: Palpi, first segment subquadrate, the second with a length about twice its diameter, the third more slender; body and halteres probably pale yellowish; legs probably pale straw; Genitalia, basal clasp segment moderately stout; terminal clasp segment about one half the length of the basal clasp segment, moderately stout, dorsal plate longer, deeply and narrowly emarginate, the lobes broadly rounded; the ventral plate long, broadly rounded apically.

Female: Length 2 mm. Antennae about three fourths the length of the body; sparsely haired, probably pale straw, fourteen sub-sessile segments, the fifth with a stem one fourth the length of the cylindric basal enlargement which latter has a length two and a half times its diameter; terminal segment with a length three times its diameter and apically a short, obtuse process; palpi nearly as in the male; body "pinkish"; halteres presumably pale yellowish; the legs probably pale straw; ovipostor about one fourth the length of the abdomen, stout, the lobes broadly rounded apically.

Type Cecid. A. 3217, N. Y. State Museum.

FLORIDA LOSES DR. DAVIS

Dr. H. S. Davis, Professor of Zoology, including entomology, at the University and a charter member of our society, has resigned to accept a position with the Bureau of Fisheries. Dr. Davis is an authority on the protozoan diseases of fishes and has been spending his summer vacations with the Bureau for many years.

Dr. Davis is a fine teacher and the University and our Society will miss him greatly. He will reside in Washington. His place will be taken by Dr. J. S. Rogers, a graduate of the University of Michigan, now teaching in Grinnell, Ia.

Science Hall, Nov. 28, 1921.

The regular monthly meeting of the Florida Entomological Society was called to order at 4:30 P. M., President Watson in the chair. Members present: Lord, Cody, Newell, O'Byrne, Montgomery, Burger, Merrill, Goodwin, Lazonby, Stirling, Beyer, Davis and Chaffin.

Application of Miss Miller of Eustis for membership was received and she was duly elected.

It was moved and passed that a Committee of three be appointed to confer with a similar committee of the Horticultural Seminar, as to the advisability of a fusion of the two societies or an arrangement for joint meetings. Dr. J. H. Montgomery, Dr. O. F. Burger and Dr. E. W. Berger were appointed on the committee. The committee was instructed to report at next regular meeting.

It was moved and passed that the society give Dr. H. S. Reed of California a smoker when he visits Gainesville next month, and that this smoker take the place of the regular December meeting of the society.

The paper of the evening was: "Bean Jassids and Their Control" by A. H. Beyer. Mr. Beyer illustrated his talk with stereopticon views and it was both valuable and interesting, showing the results of a great deal of careful work, and illustrating the value of spraying for this insect. He also showed the spraying attachment that he invented which will thoroughly wet both sides of the leaves.

There being no further business the society adjourned.

J. CHAFFIN, *Secretary.*

SMOKER FOR DR. REED

Dr. H. S. Reed, physiologist of the Citrus Experiment Station of California, located at Riverside, California, passed through Gainesville and was entertained at a joint meeting of the Entomological Society and the Horticultural Seminar on Dec. 13. Dr. Reed is spending a part of his sabbatical leave studying citrus conditions in both North and Central America and perhaps part of South America. Dr. Reed came to Florida from Mexico, where he spent four weeks in going over the most highly developed citrus regions in that country.

Dr. Reed spoke to the two societies on the results of his experimental work at Riverside, going deeply into the causes of the development or inertia of buds, a problem which strikes at the very fundamentals of pruning practice.

While Dr. Reed was in Florida it was made possible for him through the courtesy of the State Plant Board to visit the different citrus sections of our State, going down the ridge to the East Coast. He spent a part of his time through the northern part of the district and a few days in the Pinellas Peninsula. Before he left the State a letter was received in which he expressed his appreciation of the kindness shown him while in the State and also giving his impressions of our citrus section. There were two things that impressed him very much; first, the great amount of new groves planted in the last five years, and secondly, the amount of disease present in all old groves. In fact, it was his impression that the life of an orange tree in Florida was limited by disease. Two diseases which he spoke of as being of the greatest importance in the State were Melanose—Stem-end Rot and Dieback.

Dr. Reed's work in California is studying the effects of pruning on both citrus and deciduous fruit trees. He is making a quantitative study in groves, and the effects that pruning may have on the tree if practiced at various seasons throughout the year.

O. F. BURGER.

ON SOME NORTH AND SOUTH AMERICAN TINGIDAE (HEMIP.)

(Continued from page 43)

collected many Tingidae and other Hemptera in the West Indies.

Hesperotingis (Melanorophala) duryi confusa new variety.

Differs from *M. duryi* O. & D. in having the third antennal segment strongly swollen towards the apex and the pronotal carinae slightly more elevated. General color and other characters as in *duryi.* Only brachypterous specimens of *duryi* and var. *confusa* known. The principal nervures of the elytra strongly costate and the reticulations extremely irregular in the variety as well as in the typical form. The third antennal segment in *duryi* only very slightly swollen towards the apex. Described from six specimens (short-winged females), collected at Marfa and Chisos Mts., Texas, by Mitchell and Cushman. Type, No. 25,186 U. S. N. M., taken at Marfa, Texas, June 5, 1908.

This new variety somewhat confuses our conception of the genera *Melanorophala* of Stal and *Hesperotingis* of Parshley. The tips of the elytra in the brachypterous forms of Stal's species of *Melanorophala—clavata, lurida (obscura* Parshley), and *uniformis*—are distinctly divaricate at the apex. If the above species were named correctly by Osborn and Drake, it seems quite probable that *lurida* may not be more than a variety of *clavata,* and *uniformis* perhaps a synonym of *lurida.* However, it is probably best to consider Stal's species distinct until the types are examined. The short-winged form of *M. infuscata* Parshley and the long-winged form of *duryi* are unknown to the writer. In short-winged specimens of all the species belonging to the genus *Hesperotingis* (specimens of every described species before me), as in *M. duryi,* the elytra are non-divaricate at the tips. The elytra in the macropterous form of *H. illinoiensis* Drake are more broadly rounded at the tips than in similar specimens of *Melanorophala.* Thus, the shape of the third segment of the antennae makes *duryi* fall in the genus *Melanorophala* and the var. *confusa* is the genus *Hesperotingis.* On account of the non-divaricate wings of *M. duryi* it is perhaps advisable to transfer this species to the genus *Hesperotingis* and to treat the two genera as distinct until more specimens of *duryi* and var. *confusa,* including the males and long-winged forms, are secured. The long-winged form of *H. antennata* Parsh. has been described by Parshley.

Hesperotingis occidentalis n. sp.

This species is very similar and closely allied to *H. illinoiensis* Drake, but easily distinguished from it by the slightly shorter antennae, the smaller spines on the head, and costal area contains only one complete and partial series of areolae. Length, 5.1 mm.; width, 2.23 mm.

Brachypterous form: Third segment of the antennae slightly curved and a little thicker and more abruptly swollen towards the apex than in *illinoiensis.* Paranota parallel, each composed of a single row of small areolae. Rostrum reaching to the meso-metasternal suture. Costal area composed of one complete and a partial row of areolae (two rows near the base and towards the apex and one row along the middle (greater portion). Other characters very much like those in *illinoiensis.*

General color above yellowish brown. Body beneath and legs dark reddish brown. Antennae reddish brown, the fourth and almost distal half of the third segment blackish.

Two specimens. *Type* (female) from Colorado in my collection. *Paratype* (female) labeled "N. W., Uhler Coll." in the National Museum. The latter specimen has the right antenna broken. The number of rows of areolae in the costal area will at once distinguish *H. occidentalis* from *H. infuscata* Parshley from Colorado, also from *H. antennata* Parshley or *H. illinoiensis* Drake. More specimens may make *occidentalis* a variety of *illinoiensis,* but on account of the slightly more elevated carinae and the marked difference in costal area it seems best to consider them as distinct species.

Teleonemia (Cantacader) chiliensis Reed

I have examined specimens of this insect determined by the late Dr. Carlos E. Reed of Chile and the species belongs to the group of *Teleonemia* having the broad costal area. I also have a specimen from Ocampa, near Santa Fe, Argentine.

Coleopterodes liliputianum Signoret.

The genus *Solenostoma* of Signoret, Ann. Soc. Ent. Fr. Ser. 4, 111, 1863, p. 575, erected for *S. liliputianum* Sign. (*l. c.,* p. 575, pl. XIII, fig. 27), is preoccupied by a genus of fishes—Rafinesque, Analyse de la Nature ou Tableau de l'Universe et des Corps Organises, 1815, p. 90. Hence, the genus *Coleopterodes* of Philippi, Stetten. Ent. Zeit., XXV, 1864, p. 306, founded for *C. fuscenscens* Phil. (*S. liliputianum* Sign.) becomes the valid name for the genus. It is also interesting to note that Latreille, 1802, used *Solenostoma* for an order of *Acarina* and then many years later Brady and Robertson, 1873, for a genus of *Copepoda.* Brady, 1880, substituted *Acontiophorus* for *Solenostoma* in the copepods. As the genus *Fistularia* of Linnaeus, 1758, has priority over *Solenostoma* in the Fishes, the latter has lost out entirely and cannot be made a valid generic name.

FIG. 1. *Galeatus schwarzi* n. sp.; *a,* dorsal aspect; *b,* lateral aspect of hood and pronotum. Drawn by Mr. W. P. Osborn.

AN APPRECIATIVE NURSERYMAN

On July 20th the Nursery Inspector sent a circular letter to all the nurserymen in the state, from which we quote the following:

"Nurserymen in one or two sections of the State have been anxious for a modification of Rule 40. They have felt that local movements of uncovered nursery stock should be permitted. We recently visited one of these sections and made a tour of the streets in the principal town. We stopped and examined the trees that were overhanging the streets in the principal thoroughfares and in about one half hour's time we found 15 different scale insects and three different species of mealy bugs on these trees. In two cases the infestation was so severe that it was killing leaves and the insects themselves wer falling off the trees onto the ground. In a number of cases leaves affected with the scale insects in all stages were being shed because of the severe infestation. A man driving along with an uncovered load of nursery stock would park his car under the shade of such an overhanging tree, if there was a choice, so as to protect nursery stock from the heat of the sun while he attended to other business before going on to the place where he was to plant the trees. In some cases quite possibly the only place he could find to park his car would be under such an overhanging tree. In the case of trees that hang low the nursery stock could actually interlock with the low overhanging trees. In other cases the breeze would blow off infested leaves which were just about ready to drop and they would light in the uncovered nursery stock and the young insects would promptly transfer to the new host. It is altogether out of the question therefore to sanction the general movement of nursery stock in an uncovered condition."

On August 10th he received the following letter:

"Dear Plant Board:

"Last spring we set 500 strawberry plants to raise plants for our own use. It appears now that we shall succeed so well we shall have a few to sell.

"Today Judge Therien contracted for 10,000 of those same plants. When planting time comes the Judge will bring a collection of various sized boxes, pans and cans and we will fill them. He can only use a few each day. But on every box, pan or can we will fasten one of those emblems of Liberty.

"When the Judge starts for home we will carefully cover each box, pan or can with a bed quilt, for we fully realize the great importance of Rule 40 regarding strawberry plants.

"Suppose the Judge should stop his horse to rest 'neath the shade of an overhanging strawberry plant (the Judge doesn't own a car), and a lot of red ants should drop from that overhanging plant right among the plants in his wagon. Wouldn't he swear when he handled those plants?

"I think we had better cover the Judge too. A wild cat might spring from the foliage of that overhanging strawberry plant and get him. Wouldn't that be awful?

"But no matter what happens I will cheerfully and gladly write you; for you know we have lots and lots of time during the planting season. "Your obedient servant,

"Signed) ————————"

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APRIL, 1922

LIFE HISTORY STUDIES OF SOME FLORIDA APHIDS[1]

By ARTHUR C. MASON

GENERAL

It is a well-known fact that in the colder sections of the country the plant lice pass the winter in the egg stage. These eggs hatch in the spring into wingless agamic females. The process of producing apterous viviparous females usually continues throughout the season. Winged females sometimes appear, also, but in most cases only apterous forms are found. At the approach of cold weather the true sexual generations of both males and females appear. Fertilization takes place and the females lay eggs which live over winter to start the generation in the following spring. This, in general, is the mode of life of plant lice in the North.

Experimental work has been done which tends to show that the true sexual forms are produced only when conditions are not favorable to the continued life of a species in the adult form. Slingerland (23)[2] of Cornell, raised 99 generations without producing a single sexual form in his insectary where conditions of heat, plant food, etc., were favorable to the aphids. Therefore, this might happen naturally under favorable conditions. From this experiment it is reasonable to believe that plant lice can live and breed viviparously over winter in Florida, and this phenomenon has actually been observed by the writer in the case of several species of aphids. No true males have been produced, nor have any sexual eggs been laid. Other workers also have offered this as an explanation of the life of southern aphids. Quaintance (32), in describing the life history of *Aphis brassica* says that

[1]A synopsis of Part II of thesis entitled "Systematic and Biological Studies of Some of Florida Aphididae" presented by the writer to the University of Florida in 1915 for the degree of Master of Science. This is the second paper of the series; the third and concluding paper will appear in a following issue.

[2] Numbers refer to references cited. Complete list of references for the three papers will appear at the end of the third paper.

they pass the winter without the production of males and females and winter eggs. Watson (36) says that in the warm climate of Florida, especially the southern part, viviparous and parthenogenetic reproduction will undoubtedly continue all winter in the case of the tomato louse, *Megoura solani,* and also of the green peach aphid, *Myzus persicae.* Considerable work has been done by the United States Bureau of Entomology on the southern grain louse, *Toxoptera graminum,* and they have found that it will breed viviparously all winter in all southern states. In their bulletin on the subject, Webster and Phillips (37) make the statement that there is no resting or egg stage and whenever there is a sufficient food supply and warm weather the aphids become very abundant. Hubbard (22) is also of the opinion that the southern aphids will live and breed viviparously over winter, and says that the males of the orange aphids rarely if ever appear.

In spite of the fact that several species have actually been observed living on the plants throughout the winter and that most of the workers of this and other Southern States admit the probability of viviparous breeding through the winter, it is a question as to where the vast majority of aphids pass the winter. It is probable that many, if not all, of those species which live on perennial plants or on plants which are fresh during the winter will live through the season without producing eggs. Those whose host plants die in the fall must find a different host or else live over winter in a different form, and it is probable that some at least live in the egg stage. A warm spell of weather and fresh tender shoots of their host plants will bring out large numbers of plant lice which may again disappear under adverse conditions. In all probability they produce sexual forms and lay sexual eggs when the weather conditions are bad and when their food plants die out.

MYZUS PERSICAE SULZ.

This insect, commonly called the green peach louse, is probably the most common aphid which occurs in this part of Florida, and with one or two exceptions the most destructive. The writer has found it in more or less abundance at all seasons of the year except during the summer months, and on a great variety of plants. It selects the tender shoots of fruit trees, many garden crops, and ornamental plants, and when conditions are favorable reproduces in large numbers, often becoming very troublesome. They have been observed several times abundant enough to cause cabbage leaves, and also turnips, collards, and other cruciferous plants to curl up and die. Other instances where this louse has been seen in disastrous numbers were on Easter lilies, oranges, etc. Neal (26) speaks of *Myzus persicae* as very injurious to peach growing in Florida by causing the tender sprouts to curl up and die. In the green house, particularly, they reproduce very rapidly and are a serious pest.

The list of aphids as reported in the preceding paper in the Entomologist shows this louse to have been collected from thirty-five different plants in Florida. Additional plants as recorded elsewhere by Taylor (34), O'Kane (28), Chittenden (4), Gillette and Taylor (18) bring the list of hosts up to more than one hundred species. These hosts include practically all garden crops, many flowers, ornamentals, fruit trees, weeds, etc., and in widely separated families. The aphid apparently has no preference for the juices of any one plant or even single family of plants, but selects almost any which are fresh and tender. Neither is it confined to this part of the country. Other states from which *Myzus persicae* is reported are California (15), Virginia (4), Colorado (18), Minnesota (27). From these widely separated States we can conclude that the species is well scattered over this country. It is also reported by Buckton (3) from England.

Seasonal Occurrence. Beginning in the fall *Myzus persicae* was first found in October on cabbages and turnips. It continued to breed there during November and December and increased quite rapidly. In January and February it was less numerous, but a few could always be found in any field of cabbages, turnips, rape, and other related plants. It began to appear then on other plants, being found in March on lettuce, pansies, violets, and Easter Lilies. In April it appeared on some rose bushes, and on hybiscus and poinsettias, and also on beets and radishes in the garden. A month later, however, they had apparently all left those plants where they were so numerous and it was also difficult to find them on cabbages, but instead they were now numerous on Irish potatoes, corn and beans which were coming up. Here they lived while these plants were fresh, then abandoned them as they previously had the others. In June they were found on kale, egg-plant, and peppers, which were then growing, and on which they lived during the early part of the summer. Later, they seemed to entirely disappear, and although many plants were examined during the late summer no trace of them was found. Probably the adults live in small numbers on some wild plants where they were unnoticed. They were not on the garden and ornamental plants where they lived during the early part of the year. In the fall they again appeared on the cabbages, turnips, radishes, rape, etc., as they had done the previous year. They continued to live on these plants in more or less abundance all through the winter. They also appeared in November on peach tree leaves, and in December on some fresh garden plants, as beets, carrots, kale, etc. All through the winter they could be found in more or less abundance on most young fresh garden plants, also on sunflowers and various weeds. In the greehouse, also, they lived on several plants but were very abundant and destructive on the young shoots of the orange trees. Hence it appears that *Myzus persicae* selects always the plants that are coming up fresh, instead of remaining on one plant all the year.

Life History. An effort was made to breed this species in jars throughout the winter and thus determine if reproduction was entirely parthenogenetic or if sexual forms occurred; also its rate of reproduction and other factors of biological importance. The work was carried on one winter in the greenhouse and the following winter in the open air insectary which was then available. Although the aphids probably reproduced faster in the greenhouse than under natural conditions, a line on the maximum number of generations could be obtained in the open air insectary, as well as its method of living and other data of importance.

For the purpose of the experiment, small cabbage plants were used, these being placed in pots and protected with lantern globes which were set over the plants and the top covered with a piece of cheese cloth. These pots were placed on the greenhouse bench and the plants kept in the best possible growing condition. Starting with six adults an effort was made to carry six lines of the aphids through the winter. The first-born young was removed by means of a camel's-hair brush and placed on a new plant. Then, to be more sure of preserving the line, the next two or three were placed on a substitute plant to be used in case the first one should die or be lost. Only the first young was raised to maturity and its offspring kept in the same way. However, after carrying on the work for three or four months it was found that the greenhouse was not a desirable place for it. In fact, it was impossible to carry through a line there. A fungus disease became so prevalent as to kill off the aphids before reaching maturity and thus whole lines were lost. Also the extreme heat on bright days caused the plants to wilt from drying out and the aphids, as a result, would die; therefore the work was abandoned in the latter part of April until the following fall.

The following data was secured from the breeding work in the greenhouse. First, no tendency to oviparous reproduction was seen. Both winged and apterous females were produced which continued to breed parthenogenetically throughout the winter. Second, the rate of parthenogenetic reproduction as tabulated[1] for all the lines shows that the average age of the mother at birth of first young was 11.1 days, average number of offspring 27.7 and the average length of life 17.7 days. This would allow for nearly three generations per month as the maximum rate of reproduction.

The following fall the work of breeding the aphids was started again, this time in the open-air insectary. Here the previous obstacles were not encountered, and the lines were carried through successfully. Three lines were started in November and run through the winter under natural conditions. From the tabulated data we find that the average age of the mother at the birth of the first young was 15.4 days, as compared with 11.1 days in the greenhouse. We would naturally expect this period to be shorter in the greenhouse than outside. 15.4 days would be a fair estimate of the average length of time for one generation of *Myzus persicae* during the winter months. This would allow for two generations of the aphids per month as the average maximum number. The average length of the productive period was 18.2 days, and the total average number of young was 42.8, which would make an average of 2.3 per day. The largest number for any one day was 8. The average length of the whole life was 36.2 days. There usually was a period of one to ten days between the birth of the last young and death. The nymph molts at the approximate ages of one or two days, five days, ten days, and fourteen days. A complete tabulation of the data on the life of one line shows that three generations usually overlap, also a day of high productiveness is usually followed by one of low productiveness, and vice versa.

The same method of reproduction occurred here as during the preceding winter in the greenhouse. No males or sexual eggs ever appeared in the breeding jars. Hence we can conclude that this species of aphid lives throughout the year on fresh plants and breeds viviparously continuously.

Parasites and Enemies. In the greenhouse, *Myzus persicae* was very heavily parasitized by the fungus, *Entomophthora*

[1] The tables are necessarily omitted because of lack of space and only summaries of the results given. A number of photographs illustrating the thesis are also excluded.

aphidis (identified by Dr. Roland Thaxter of Harvard). This disease was so serious, in fact, that it interfered with the breeding experiments which were being carried on there by killing off the aphids. It was also found on the aphids outside both in the spring and summer months. On one occasion it was so common that the under sides of the pansy leaves were covered with the dead bodies of the aphids. Suitable weather conditions are necessary for it to grow well and this is the reason it killed off all the aphids in the greenhouse where it is warm and humid. Undoubtedly this disease accounts largely for the disappearance of these insects during the summer for the warm humid climate of the rainy season is conducive to its growth. An interesting feature of this fungus is that it does not grow on other species of aphids. Several attempts were made to grow it on *Aphis gossypii* on orange trees in the greenhouse and under the same conditions as when it was growing on *Myzus persicae* on cabbages, but without success. The dead bodies covered with spores were rubbed over the bodies of *Aphis gossypii* and leaves with them were pinned to orange leaves containing *Aphis gossypii*, but in no cases could it be made to grow on other aphids, and never have any instances been observed under natural conditions where other species of aphids were attacked by it.

An internal hymenopterous parasite, *Diaeretus rapae* Curt. often parasitized this aphid very severely. The insects fly about and deposit their eggs in the bodies of the aphids by piercing them with their ovipositor. Two species of Syrphus flies were found feeding on the aphids, and also the lace-winged fly, *Chrysopa oculata* and a lady beetle, *Chilocorus bivulnerus*.

ALPHIS GOSSYPII Glover

Aphis gossypii commonly known as the melon louse, is perhaps the most important aphid in the State from an economic standpoint, and also one of the most numerous. It occurs in all seasons of the year and some observations were made as to its hosts and method of living through the year. An interesting fact about this aphid is the many forms in which it occurs. The citrus form is a dark slate color or velvety green, while it usually occurs on melons in a yellowish form. However, the yellow, melon form is also occasionally seen on orange trees. These forms are so radically different as to be hardly recognizable as the same species, in fact they were called different species for many years and known as the citrus aphid, the melon aphid, and the cotton aphid, until Pergande (30) discovered that these were simply varieties of the one species, *Aphis gossypii.*

It has a number of other hosts also including many garden crops, flowers, weeds etc. The preferred food plants however are those belonging to the melon family. Many of these are listed as hosts for Florida in the preceding list. Others are reported by Chittenden (5) and Quaintance (32). About thirty different plants are mentioned as hosts. The insect also has a wide range of distribution both in the United States and other countries. Sanderson (33) says the melon aphid is found throughout this country, southward through Central America, and is usually more destructive in the South than in the North. Chittenden (5) gives its distribution as the West Indies, Mexico, Brazil, and doubtless elsewhere in South America, and generally distributed throughout the United States, but more injurious in the Southwest than elsewhere.

Seasonal Occurrence. This louse was found early in the fall feeding on orange trees and continued to live there throughout the fall or until December. They then disappeared and were not seen on the oranges again until the following April. During the winter however they appeared in large numbers in the greenhouse on young orange trees and for several weeks continued to breed so rapidly as to nearly kill the tender shoots of the trees. They collected on the new growth, causing the leaves there to curl up and become deformed. This continued until the latter part of March when there was a notable decrease in numbers in the greenhouse and by the middle of April none of them were present. They gradually disappeared, seeming to migrate as fast as they became adult. About this time the form of the species known as the melon aphid appeared on some calabash plants growing in another section of the greenhouse, and lived there for a short time.

In February they were collected outside on moonflowers, and in April appeared on the orange trees outside, where they lived for a short time and then evidently migrated to the melons. During the first part of April the species was present on Easter lilies in large numbers, but here, also, lived for only a short period. From the time the cucumbers began to grow in April *Aphis gossypii* lived on cucurbitaceous plants. It was never difficult to find them in fields of cucumbers, melons, squash, or cantaloupes, and often their presence was very noticeable. They continued to

(Continued on Page 62)

The

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REPORTS OF MEETINGS OF THE SOCIETY

Jan. 23, 1922.

A business meeting of the Florida Entomological Society was called to order at 7:45 P. M., in Language Hall, President Watson in the chair. Members present: Stirling, Davis, Cody, Montgomery, Berger, Merrill, Burger, Lord and Beyer.

The report of the joint committees composed as follows: Dr. J. H. Montgomery, O. F. Burger and E. W. Berger, representing the Florida Entomological Society, and Mr. F. M. O'Byrne, Mr. E. L. Lord and A. H. Beyer, representing the Horticultural Seminar of the University of Florida, was delivered by the committee chairman, Dr. Montgomery. The report providing for joint meetings as recommended by the joint committees, was adopted by the Society.

The immediately succeeding procedure was the election of officers for the ensuing year, which were elected by acclamation as follows: Mr. Frank Stirling, president; Dr. O. F. Burger, vice president; Mr. A. H. Beyer, secretary; Mr. F. M. O'Byrne, business manager of ENTOMOLOGIST and treasurer; Dr. J. H. Montgomery, member Executive committee; Prof. J. R. Watson, Editor of ENTOMOLOGIST; Dr. Wilmon Newell, Associate Editor of ENTOMOLOGIST.

Smoker for Dr. Davis

After the business meeting the evening was given over to a smoker in honor of Dr. H. S. Davis, who has tendered his resignation as head of the Department of Zoology to accept the position of Fish Pathologist, U. S. Bureau of Fisheries, Washington, D. C.

At the smoker which convened at 8:15 there were present as guests: Dr. A. A. Murphree, Major Floyd, Dr. Trusler, Dr.

Anderson, Dr. Benton, Dr. Crow, Dr. Leigh, Dr. Shealy, Prof. Perry, Prof. Black, Dr. Simpson, Dr. Steik, and Prof. Willoughby. Mr. Stirling officiating. At the conclusion of the smoker Dr. Murphree suggested that a committee be delegated to prepare a smoker on the evening of January 30th in honor of visitors interested in the purposed Institute of Tropical Agriculture who are to be on the campus at that time. The motion was made and committee was appointed by Chairman Stirling.

A. H. BEYER, Secretary.

Feb. 27, 1922.

The Society met in regular monthly joint meeting with the Horticultural Seminar of the University and was called to order by President Floyd of the Horticultural Seminar. Members present: Stirling, Lord, Beyer, Berger, Watson, Montgomery, Merrill, Burger and Stone.

Mr. Stirling exhibited samples of an "orangelo," a hybrid between an orange and a grapefruit. This tree was grown from budwood from the Bureau of Plant Industry, U. S. D. A., by Mr. Henderson on the lot now owned by Mr. Stirling.

The first paper of the evening was by Dr. W. B. Tisdale on The Development of Cabbage Resistant to the Fusarium Disease Commonly Known as "Yellows." Prof. Watson gave a report on the entomological meetings of the A. A. A. S. at Toronto. Dr. Montgomery gave a report on the meeting of the Cotton States Entomologists at Atlanta during the previous week. Prof. Lord gave some notes on horticulture.

PERSONALS

A new member of our Society is Mr. Reginald Hart, formerly with the Bureau of Plant Sanitation of Cuba, an entomologist of wide experience with tropical insects, who has been added to the State Plant Board with headquarters at Gainesville.

Another new member is Mr. Chas. Ballou of Havana, a member of the Bureau of Plant Sanitation of Cuba.

Dr. W. B. Tisdale has entered upon his duties as Pathologist of the Tobacco Substation at Quincy. Dr. Tisdale is a native Floridian who received his doctor's degree from the University of Wisconsin where he has also been teaching.

Dr. J. S. Rogers has entered upon his duties as head of the Department of Biology in the University, taking the place of Dr. Davis. Dr. Rogers comes to Florida from the University of Michigan.

Mr. Geo. D. Smith, a specialist in boll weevil control, has resigned from the Bureau of Entomology to accept the position of Associate Entomologist of the Plant Board. He will have has headquarters at Madison.

Our president, Mr. Frank Stirling, left for Raiford on March 1st. The length of his stay is "indeterminate."

Prof. L. C. Corbett of the Bureau of Plant Industry, with headquarters at Washington, recently accompanied Director Newell on a visit to the Citrus Sub-station at Lake Alfred.

"Red Spider on the Avocado" is the title of Bulletin 1035 of the U. S. D. A. (Professional Paper) by Mr. G. F. Mosnette. This well illustrated and valuable bulletin should be in the hands of every member interested in the avocado industry.

LIFE HISTORY STUDIES OF SOME FLORIDA APHIDS

(Continued from Page 59)

live here throughout most of the summer, or until the vines dried up, being collected on watermelons as late as July 23. After that, nothing was seen of them until October when they again appeared on orange trees. The latter part of November there occurred a freeze which killed the orange leaves while many of the aphids were present on some trees. The lice were not hurt by the freeze but continued to live for two days afterward or until the leaves wilted and dried up, when they died for lack of food. In January they again appeared in the greenhouse and continued to live there in increasing numbers throughout the rest of the winter, or until the first part of April. An interesting feature about them is that they will not live in the greenhouse in the fall. When first found in October, several attempts were made to colonize them on the orange trees in the greenhouse, but without success.

This, in general, seems to be the life history of this louse in Florida. They will live on melons and other fresh plants during the spring and summer and then migrate to the orange trees in the fall. The season of late summer and early fall, after the melon vines have disappeared, is probably spent on some of the numerous wild plants on which they have been reported. It is possible that they lay winter eggs on the orange trees to pass a part of the winter, at least in the northern part of the state or when the winter is especially cold. This may account for the fact that they were not found outside on the oranges except during part of the winter. However, no sexual forms or eggs were ever seen and it is the writer's belief that they did not occur. Hubbard (22) is also of the opinion that the orange aphid lives over winter as an adult on the orange trees. The males and winter eggs were not discovered and probably do not occur, at least in ordinary seasons.

Parasites. *Aphis gossypii* has several parasites and predaceous enemies. It is severely infested by the internal parasite, *Diaeretus rapae,* which often prevents it from getting started in a locality. The lace-winged flies, *Chrysopa oculata,* and *Hemerobius sp.,* and several species of lady beetles and syrphus flies also prey upon this aphid. They are often seen on orange trees which are harboring the lice. The aphid is not susceptible to fungus diseases however. Attempts made to get two species of fungi to live on them in the greenhouse failed. *Entomophorus aphidis,* which kills off *Myzus persicae* in large numbers, would not attack *Aphis gossypii,* nor would *Acrostalagmus albus,* a culture of which was received from Porto Rico growing on the cane aphid *(Sipha flava).*

LACHNUS PINI L.

Although not of any economic importance some studies were made of this large pine aphid since it was used in some of the experimental work. Like the two preceding species, these aphids lived on the pine trees throughout the winter and continued to produce their young viviparously. The pines not being deciduous a fresh supply of food was always available. The cold was never sufficiently acute to kill the adults as in the case of its northern congenors, and hence winter eggs were not a necessity.

This aphid never occurs in large numbers probably due to the high percentage of parasitism. Its large size makes it an easy prey for hymenopterous parasites. However a few of them could usually be found on the small pines of the species *Pinus taeda.* They continued to live there all through the winter and produce their young alive. In the summer, however, they became very scarce and were difficult to find.

Life History. No very complete experiments were conducted to work out the life history of the species, but a good line on the number of generations and rapidity of breeding was obtained from the experimental work which will be recorded in the next paper. The average time required for the young to become adult was nineteen days, or in other words, the number of generations will be determined at this rate. Several days often elapse between the time of becoming adult and that of starting to reproduce, particularly in the case of winged females, hence a fair estimate of the average length of a generation probably will be nearly thirty days. In the laboratory, however, the average age of maturity was 12.6 days which is less than under natural conditions. Hence it is seen that the rate of reproduction for this aphid is much lower than for those previously described. This also accounts to some extent for their lack of abundance.

Parasites. The most destructive parasite of this louse is the internal hymenopterous insect, *Aphidius bifasciatus* Ashm. This is a small wasp-like parasite but quite abundant, and the cause of killing many of the colonies. On several occasions one of these was observed ovipositing in the aphids. It would fly to the branch on which the aphids were feeding and approach cautiously until near the colony, then make a quick dart toward them and thrusting the abdomen between and under the legs, would quickly pierce the aphid with its ovipositor and run back. If undisturbed, it would repeat this practice several times. However, the ants which usually attend these aphids would often watch for this invader and drive him off before he reached the aphids. The parasite also appeared to be afraid of the ants. Another internal parasite of this louse is *Aphidius pinaphidis* Ashm. A few of these were bred from parasitized aphids, but they evidently are not as numerous as the other species. *Pachyneuron micans* How. was also bred from some parasitized bodies, but this may be a secondary parasite.

Other enemies are the lady beetles, syrphus flies and aphis lions. Adults and larvae of *Coccinella sanguinea* were collected while feeding on the aphids. Syrphus fly larvae were often found feeding on the aphids and also *Chrysopa oculata* and *Hemerobius sp.*

Ants. An interesting feature of *Lachnus pini* is the protection which the ants give them. Like all other plant lice the colonies are constantly attended by ants, and in this case several species of ants have been noted. They assist in spreading the species by carrying their young ones about and also protect them by driving away their parasites and predatory enemies. The most noticeable method of protection was a sort of cover built over them by the ants. The primary object of this probably was to keep parasites away but it would also serve as a protection against cold and storms. The ants were often observed during the fall and early winter carrying particles of loose bark and the woolly covering of the pine bark and building a covering over the colonies of aphids. Another advantage of the ants, which, by the way, is mutual, is by eating the honey-dew secreted by the aphids.

NEW THYSANOPTERA FROM FLORIDA. IX.

J. R. WATSON

71. Idolothrips flavipes Hood.

From dry leaves on the ground in the forest. Hog-town Creek, Feb. 27, 1921. Gainesville, March, 1921. These represent but the third capture for this species—all from dried leaves. It was described from Illinois and Morgan has recorded it from Tennessee.

72. Hoplandrothrips pergandei (Hinds). (Phloeothrips pergandei Hinds.).

Sweeping grass in pasture. Gainesville, Fla., Feb. 25, 1922. Previously reported from Amherst, Mass. (type locality) and Tennessee (Morgan).

73. Hindsiana pini n. sp.

Head, thorax, and tube brown; most of abdomen, legs and antennae light yellow.

Measurements: Total body length 1,1 mm. Head; length 0.16, width 0.15 mm.; prothorax, length 0.16, width 0.25 mm.; mesothorax, width at the base 0.23 mm.; metathorax, greatest width 0.18 mm.; abdomen, greatest width 0.28 mm.; tube, length 0.11, width at base 0.05, at apex 0.03 mm. Antennae: total length 0.28 mm.; segment 1,18; 2,40; 3,43; 4,48; 5,48; 6,40; 7,38; 8,32 microns.

Head a little longer than broad, cheeks slightly arched. Postocular bristles long, colorless and bearing a small knob at the apex; a pair of minute bristles opposite them near the median line, one behind each ocellus, and one directly behind each of these and opposite the posterior margins of the eyes. Eyes small, not protruding, black, non-pilose, facets large. Ocelli large; posterior pair situated opposite the anterior third of the eyes but not touching their margins; yellow, bordered with dark crescents. Mouth cone reaching 2-3 across the prosternum, rounded at the end. Antennae clear yellow except segment 1 which is shaded with brown and 7 and 8 which are brown. Segment 1 cylindrical; 2 urn-shaped; 3-5 short clavate; 6, ovate, brownish yellow; 7, obovate; 8, conical. Bristles and sense cones short, colorless and inconspicuous, one each on the outside near the apex of segments 5 and 6 fairly long.

Prothorax about as long as the head and half again as wide; one strong knobbed bristle on each posterior angle and a similar one on each coxa; a short one on each anterior angle and one midway on each side. Mesothorax much narrower than the prothorax and the sides abruptly converging posteriorly. Metathorax but little wider than the posterior border of the mesothorax. This very narrow pterothorax gives the insect the appearance of having a slender waist. Legs clear yellow except the bases of the fore femora which are clouded with brown. Fore femora slightly enlarged. Fore tarsus with a short curved spine. Wings well developed but their membranes not attaining the end of the abdomen; that of the hind wings clear, of the forewings gray, narrowed in the middle, fringed with long hairs, three interlocated ones.

Abdomen elongated oval in outline, clear yellow, clouded with brown towards the base; bristles few, colorless, short except on the last three segments each of which bears a single long bristle near each posterior angle; those on the ninth segment much longer than the tube and pointed, all others knobbed. Tube rather small brown; terminal bristles short, pointed.

Described from a single female taken from a young long-leaved pine tree at Blanton, Fla. February, 1922.

The genus *Hindsiana* Karny is distinguished from *Haplothrips* by the light color of the abdomen and the long bristles on the ninth abdominal segment. Karny in "Zur Systematik der Orthopteroiden Insecten" (Treubia, vol. I, Livr. IV. pp. 211-269 gives a very useful key to the families and genera of Thysanoptera.)

ANOTHER NEW THRIPS FROM COCOANUTS FROM CUBA

J. R. WATSON

Hindsiana cocois, n. sp.

General color light brown, tibiae, tarsi, and intermediate antennal segments yellow.

Measurements: Total body length 1.2 mm. Head, length 0.18, breadth 0.13 mm.; prothorax, length 0.11, breadth 0.22 mm.; mesothora, breadth 0.21 mm.; metathorax, breadth 0.22 mm.; tube, length 0.10, width at base 0.05, at the apex 0.03 mm. Antennae: total length 0.29 mm.

Antennal Segment	1	2	3	4	5	6	7	8
Length	24	67	43	49	40	37	41	27 microns
Breadth	....	27	24	26	24	21	19	12 microns

Head considerably darker than the body; nearly 1.5 times as long as broad, vertex smooth; cheeks slightly bulging, roughened by a few low papillae. Post ocular bristles large, almost colorless, expanded at the apex into a knob. Eyes rather small, occupying less than a third the length and less than a quarter the width of the head, not pilose. Ocelli widely separated, posterior pair situated anterior to the middle of the eyes, bordered with dark crescents. Mouth cone short, not reaching the middle of the prosternum, slightly swollen at the base, very bluntly rounded at the tip. Antennae: segment 1 dark brown, 2,3 and the base of 4 yellow, others progressively darker towards the tip; 1 trapezoidal, rather large, 32 microns wide at the base, 22 at the apex; 2 urn-shaped; 3 wedge-shaped; bristles, and sense cones short, pale, and inconspicuous.

Prothorax about two-thirds the length of the head, breadth twice the length, a heavy, knobbed bristle on each posterior angle and a somewhat weaker one on each coxa.

Pterothorax slightly narrower than the prothorax, sides straight, converging strongly posteriorly. Legs rather long and slender. Wings well developed, margined with long but comparatively few hairs, 3 or 4 inter-located ones on the fore wings. Membranes of the anterior pair quite dark, strongly constricted in the middle.

Abdomen cylindrical, rather long, yellow except the tube. Posterior segments provided with long, pointed yellow bristles. Tube dark brown, abruptly swollen at the base, terminal bristles twice as long as the tube, pointed, brown. Male not seen.

Larvae bright yellow with considerable bright red hypodermal pigmentation. Tube and antennae brown. Eyes red.

Described from five females and two larvae found by Mr. Geo. B. Merrill under scale caps of cocoanuts from Cuba, intercepted at Key West quarantine station by inspectors of the State Plant Board. Occurred in company with a single specimen of *Franklinothrips vesperformis* (Crawford).

Type in the author's collection.

SOME BEETLES NEW TO FLORIDA

J. R. WATSON

Among a collection of beetles recently determined for the Experiment Station by Dr. W. S. Blatchley are the following which are not recorded for Florida in Leng's "Catalogue of the Coleoptera of America, North of Mexico." Unless otherwise indicated they were collected by the writer in the vicinity of Gainesville.

Cicindela rectilatera Chd. Along Prairie Creek. Abundant on mud banks in the stream. June 23, 1918. Campus of the University, July 7, 1918.

Baeocera deflexa Csy. Beaten from *Aesculus pavia.* March 4, 1917.

Tritoma affinis. On *Coprinus,* Aug. 19, 1919.

Pachybrachys viduatus (Fab.). Shrubs in "flatwoods" July 4, 1918. With *P. litigiosus.*

Microtomus sericans Lec.

Eros aurora Hbst. At blooms of Bee Balm (*Monarda*), Oct. 10, 1920.

Litargus balteatus Lec. Sweeping grass and herbs at Lake Wales, June 10, 1920.

Scymnus americana. On cottony cushion scale (*Icerya purchasi*) at Key West, March 5.

Cryptorhopalum picricorne Lec. Gainesville, abundant in *Crataegus* bloom. March 10, 1917; Sanford, in bloom of *Cassia sp.* Aug. 3, 1918.

Anthrenus scrophularia Lis. On blossoms of wild plum. Feb. 23, 1919.

Pocadius helvolus Er. In puffball, June 30, 1918.

Scirtes orbiculatus (Fab.). On French mulberry, June 16, 1918; from rotting sweet potatoes May 22, 1920.

Cyphon obscurus. Sumatra, Fla. On *Citrus.*

Attalus humerales. At bloom of cherry laurel, Feb. 12, 1919.

Enoclerus nigripes Say. On Basswood May 18, 1920.

Haltica amoena Horn. Leng records this from Georgia but it is given in Blatchley's list from Sanford, 1915. Among the pine needles on the floor of a pure stand of long leaf pine Jan. 27, 1918; Viking, Fla., June 15, 1915.

Anoplitis inaequalis (Web.). On *Polymnia* and *Rhus* July 21, 1918.

Ganascus ventricosus Lec. Recorded by Leng as "N. C. (Fla.?)" Gainesville on *Hickoria,* Oct.; Tavares on closely grazed carpet grass.

Gnathium francilloni Kirby. On various flowers, Sep.

Hydnocera suturalis Klug. Recorded by Leng as occurring in South Florida; Gainesville, May 22, 1920, on *Erigeron ramosus.*

Ceratona caminea (Fab.) Bean Leaf Beetle. Common about Quincy but rare about Gainesville. A single capture by sweeping grass along a stream. June 9, 1918.

Adistemia watsoni (Woll). At flowers of Astragulus March 15, 1917.

Baris australis Blatch. Recorded in Jour. N. Y. Ent. Soc. June, 1920. Palatka. On New Jersey Tea (*Ceanothus*) Sept. 12, 1919.

Sphenophorus venatus Say Gainesville Jan. 1.

Tanymecus lacaena Hbst. There seems to be no record of the food plants of this beetle. It feeds in numbers on *Baccharis* and to a less extent on dog fennell (*Eupatorium capillifolium*).

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THE CORN LEAF-TIER, LEREMA ACCIUS S. & A.*

GEO. G. AINSLIE,
Entomological Assistant, Cereal and Forage Insect Investigations, Bureau of Entomology.

The corn leaf-tier, *Lerema accius* S. & A., is one of a large number of corn feeding species of insects which have never been known to cause appreciable damage, but are still a potential pest of this plant and of other economic grasses. It belongs to the *Hesperidae* or skipper butterflies, several of which, in the South are recognized as pests, among them the Bean Leaf Folder (*Eudamus proteus* L.), and the Larger Canna Leaf Roller (*Calpodes ethlius* Cramer).

The original description of the adult was published in a paper on the "Lepidopterous Insects of Georgia" by Smith and Abbott in 1797 under the name of *Papilio accius*. In 1872 Mr. S. H. Scudder erected the genus *Lerema* with this species as the genotype. The most complete account so far published is one by this same author in his "Butterflies of New England" in 1889. The records of the Bureau of Entomology regarding this species are very meager. Mr. R. A. Vickery reported finding a single small larva on corn at Brownsville, Texas, Mr. W. R. McConnell noted it at several points in Mississippi, and Mr. W. H. Larrimer found larvae on two species of grasses at Chickasha, Oklahoma. The above records, a few other scattered observations and a series of rearings at Lakeland, Florida, during the winter and spring of 1913 furnish the material for the following paper.

It is impossible to fix definite limits for the range of this species. It was first described from Georgia, the exact locality not being indicated. An attached note adds that "It is also found in Virginia." Scudder's map of its distribution shows it

*Published by Permission of the Secretary of Agriculture.

to occur throughout a narrow strip of territory along the Gulf and Atlantic coasts as far north as Massachusetts, and another along the Mississippi River as far north as southern Illinois. It has been found by Mr. Larrimer at Chickasha, Okla., by the writer at Chattanooga and Leadvale, Tenn., and Clemson College, S. C., all outside of the above limits and indicating that its distribution is more general throughout the Southeastern states than Scudder's map leads one to believe. Like several of its close relatives it is probably of tropical origin and habit and if so its northern limit fluctuates from year to year with the severity of the winter and the conditions favoring northward flight during the summer.

The adult butterfly has a wing expanse of about 33 mm. and in color is a dark, warm brown with six more or less rectangular white spots on the fore wing of the female (in the male but four and these much smaller). Three of the six in the female are small and in a close, nearly straight row near the anterior margin about two-thirds out from the base of the wing; two others, of which the posterior is the larger, lie between this group and the hind margin of the wing, and the last at the upper edge of the cell. In different individuals the prominence of these markings varies considerably but their relative size and position are constant. The hind wing is uniform brown above, and beneath both fore and hind wings shade to purple along the distal margins. The butterfly is a strong flier and has the erratic, zig-zag flight characteristics of its family.

The eggs are laid singly and widely scattered, usually on the lower but sometimes on the upper surface of the leaf. Seldom is more than one found on a plant and we have never seen two on the same leaf. They are white with a pearly luster, subhemispherical in shape and about two-thirds as high as wide, with the basal angle rounded, diameter 1.2 mm., height .8 mm. The chorion is finely reticulated. The rounded basal angle serves to distinguish this from the otherwise very similar egg of *Calpodes ethlius* in which the wall joins the base with a sharp right angle.

Since oviposition has never been observed, the exact length of the incubation period is not known. Of eleven eggs taken in the field at various times, seven hatched in nine days, two in six days, and two in five days, indicating that nine days is probably the normal period. A day or two after being laid the egg takes on a creamy tinge, on the sixth day a faint mottling appears near the apex and on the eighth day the dark head of the young larva can plainly be seen through the shell. The embryo lies coiled around the circumference of the egg with the head a little to one side of the center. The first break in the shell is made by pressure of the mandibles and the larva then proceeds to cut an irregular hole in the apex, rotating within the egg during the process. When the opening is as large as its head the larva emerges. The entire operation occupies some time, one larva which broke the shell at 8:00 A. M. having just released itself at 3:00 P. M. In the meantime the head of this larva changed from chocolate-brown to glistening black. The empty egg-shell is translucent white, waxy and parchment-like in texture except the flat base which is transparent.

After a brief survey of the immediate vicinity the newly hatched larva returns to the egg shell and consumes it, leaving only the disk-like base which it cannot be induced to touch even when it has been loosened from the leaf. This little glistening disk can almost invariably be found somewhere on each infested plant. After breakfasting on the egg-shell the small larva selects a location on the upper surface of the leaf, near the edge and begins to construct its retreat by placing a layer of silk fibers on the surface. The effect of this is quickly seen in the gradual curling of the blade. When a groove has been thus formed the opposite edges are connected by a silk fiber which bridges the concavity. This fiber is added to until it forms a strong strand and its contraction draws the edge over until it touches the surface of the blade, after which other similar attachments are formed at short intervals until a complete tube, open at both ends is formed. In the finished retreat of a full grown larva there are from five to twelve such fastenings. In the instances observed by the writer the fold was always over onto the upper surface of the leaf, but Mr. McConnell has noted that at Greenwood, Miss., larvae feeding on sorghum folded the leaf upward and downward in about equal numbers. The earlier retreats are generally near the tip. Later the edges of a narrow leaf may be drawn together or the margin drawn over to the midrib at any point along the blade. When the roll is complete the larva cuts a deep narrow notch into the leaf at each end and seals the ends. The skill with which the weak and apparently helpless larva manipulates the thick, stiff corn leaf is remarkable.

During the day the larva never leaves its refuge but feeds on the leaf close to the ends of the tube or on the tube itself. At night other parts of the leaf or even other leaves are eaten. When one retreat is outgrown or consumed another is constructed near by. The feeding is spasmodic, sometimes nothing being eaten for two or three days and then in a night almost all of a small plant consumed. When ravenously hungry a larva will cut holes and notches in a leaf without waiting to construct a retreat. The larva at any age seems unable to cling to the naked leaf surface but when moving about always swings its head from side to side laying down silk fibers to which it clings. In this manner it readily climbs a perpendicular glass surface. Excrement is ejected with a snap which sends it to a distance of two or three feet from the plant.

The newly hatched larva is pale yellow with glistening black head and with a single narrow black cervical band separated a short distance from the head and running down on each side to the latero-ventral margin where it ends in a small black dot. The neck-like appearance, caused by a decided constriction of the body just behind the head, is more conspicuous in the later stages as is also the vertical position of the head. The body is provided with scattering minute shining hairs, a pair of which projecting caudad are somewhat larger than the rest. As the larva feeds it assumes a greenish color which, in the second and later instars, is covered with a glaucous, frost-like overcolor. A darker green meso-dorsal line appears and the caudal end of the body becomes flattened and boat-shaped, covering and concealing the caudal pair of legs. A pair of black dots on the third segment from the caudal end becomes more conspicuous with each succeeding molt. The surface of the head becomes granular and sparingly hirsute and under a lens the skin of the body is seen to be covered with minute black bristles.

There are five instars which may be distinguished by the head widths as given below in millimeters:

Instar	Average	Maximum	Minimum
First	0.6249	0.6530	0.6063
Second	0.9001	0.9328	0.7929
Third	1.2599	1.3059	1.2126
Fourth	1.7492	1.8656	1.5858
Fifth	2.3599	2.5186	2.2387

These measurements were taken from a large number of head casts and while there is considerable variation within each in-

(Continued on Page 10)

A NEW AND REMARKABLE FIG MIDGE

By E. P. FELT, State Entomologist, Albany, N. Y.

The remarkable form described below differs from all other gall midges known to us by the forty-one antennal segments in at least one sex, presumably in both, and in addition possesses structural peculiarities which necessitate the erection of a new genus.

Ficiomyia n. g.

The genus runs in our Key to the Chilian Scheueria Kieff, from which it is easily separated by the much greater number of antennal segments, the occurrence of distinct stems on the flagellate antennal segments of both sexes, the absence of marked reticulations in the circumfila and the claws being distinctly longer than the pulvilli. The male genitalia present striking peculiarities, evidenced in part by the subapical insertion of the terminal clasp segment.

Type F. perarticulata n. sp.

Ficiomyia perarticulata n. sp.

The insects were reared from the fruits of *Ficus aurea* by G. F. Moznette of the Federal Bureau of Entomology, stationed at Miami, Fla., and forwarded under date of February 9, 1922. Unfortunately, these specimens were somewhat broken in transit and as a consequence, the descriptions given below are not complete in certain details. The larger reddish females were much more abundant in the sending than the few smaller, yellowish males.

Male:—Length 2 mm. Antennae probably one-fourth longer than the body, sparsely haired, light fuscous yellowish, probably forty-one segments, the fifth with a stem about three-fourths the length of the sub-cylindric basal enlargement, which latter has a length almost twice its diameter, basally a sparse whorl of moderately stout setae, sub-apically a somewhat thicker whorl of long, bent setae; low circumfila occur at the basal third and apically; terminal segments missing; palpi probably uniarticulate; mesonotum fuscous yellowish; scutellum and postscutellum yellowish; abdomen fuscous yellowish; wings hyaline, rather thickly clothed with fuscous scales; sub-costa uniting with the margin at the basal third, the nearly straight third vein at the apex of the wing, the fifth at the basal fourth, its branch at the basal third; halteres pale yellowish; coxae fuscous yellowish; legs mostly dark straw; the distal tarsal segments pale straw; claws long, rather stout, unidentate; the pulvilli about one-half the length of the claws (Unguial characters probably true of all legs and for both sexes); genitalia, basal clasp segment moderately long, stout, with a spud shaped apical process having a length nearly equal the diameter of the segment; terminal segment sub-apical, moderately stout, slightly curved and with a stout, chitinous spur apically; dorsal plate long, broad, very deeply and triangularly divided, the lobes broadly triangular and thickly clothed apically with long, stout setae; ventral plate long, very deeply and roundly emarginate, the slender, subacute lobes with a length fully six times their width; harpes moderately long, broad, deeply and triangularly emarginate; the lobes broad, and broadly rounded apically; style long, broad, broadly rounded apically.

Female:—Length 2.5 mm. Antennae probably shorter than the body, sparsely haired, fuscous yellowish, forty-one segments, the fifth with a stem one-third the length of the sub-cylindric basal enlargement, which latter has a length one-fourth greater than its diameter, basally a thick whorl of long, stout setae extending to the tip of the segment; low circumfila at the basal third and apically; terminal segment slightly produced, roundly cuboidal and with a length nearly one-half greater than its diameter. Palpi: uniarticulate, the one segment having a length nearly twice its diameter and bearing apically a sparse group of rather long, stout setae; mesonotum dark brown; sub-median lines yellowish; scutellum dark brown; postscutellum yellowish brown; abdomen dark reddish brown; halteres pale yellowish; coxae reddish brown; femora a variable fuscous; tibiae and tarsi dark straw; the ovipositor about one-fourth the length of the abdomen, fuscous yellowish; terminal lobes with a length about three times the width, broadly rounded apically and with a few sparse setae. Other characters probably as in the male.

Type Cecid. A 3228, N. Y. State Museum.

ANOTHER CAMPHOR THRIPS

J. R. WATSON

Ny

Karynia gen. Nov. *(Phloeothripidae, Cryptothripinae).*

Head longer than broad and longer than the prothorax. Wings comparatively weak and short; membrane slightly narrowed in the middle. Tibiae without teeth; tarsi of ♀ armed with a large curved tooth; fore femora thickened in both sexes, without teeth near the apex. Antennae 8-segmented, segments 6 and 7 not united. Ocelli present, widely separated. Labrum sharp-pointed and extending beyond the remainder of the broadly-rounded mouth cone. Bristles of the last abdominal segment long and slender, extending beyond the tube, at least in the ♀. Intermediate antennal, segments little longer than the others. Cheek roughned but without bristles. The new genus differs from *Megalomerothrips* (Watson) in that the intermediate antennal segments are not elongated and the male lacks the long tarsal tooth.

Type K. weigeli.

K. weigeli, n. sp.

♀. Color uniformly dark brown except the fore tibiae and tarsi and antennal segment 3, which are brownish yellow.

Measurements: Total body length 1.4 mm. (1.2 to 1.6). Head, length 0.17, width 0.14 mm.; prothorax, length 0.12, width (including coxae) 0.25 mm.; mesothorax, width 0.23 mm.; abdomen, greatest width 0.28 mm.; tube, length 0.11, width at base 0.056, at apex 0.029 mm.

Antennae: total length 0.29 mm.

Segment	1	2	3	4	5	6	7	8
Length	32	41	47	48	43	36	42	28
Breadth	27.5	27	26	28	22	21	20	12 microns

Head about 1.2 longer than wide and considerably longer than the prothorax, smooth except for a few longtitudinal lines; cheeks slightly arched, slightly converging posteriorly, roughened; post-ocular bristles about as long as the eyes, knobbed, pale, no other prominent bristles on the head. *Eyes* rather small, scarcely a third the length of the head, roughly triangular in outline, dark. *Ocelli* large, yellowish brown, well separated; posterior pair situated opposite the middle of the eyes, close to, but not touching, their margins; bordered by narrow orange crescents. *Mouth cone* reaching .6 the distance across the prosternum. *Antennae* about 1⅔ as long as the head, segment 1 concolorous with the head; 2 lighter brown, urn-shaped with a broad pedicel; 3 yellowish-brown, almost triangular; 4 brown but lighter than 5-8 which are uniformly dark brown, conspicuously the largest segment; 6 conspicuously short and narrow, ovoid; 7 barrel-shaped; 8 conical. Bristles and sense cones pale and inconspicuous.

Prothorax (including coxae) fully twice as wide as long, trapezoidal in outline; posterior angles well rounded, bearing a single pale, knobbed bristle of medium length, a somewhat longer one on each coxa, also knobbed; a minute bristle on each anterior angle.

Mesothorax somewhat narrower than the prothorax, sides converging sharply posteriorly. Metathorax, sides nearly straight and parallel. Wings short, membrane reaching to about the middle of the abdomen, colorless except for a brown area at the base; fringing hairs long but sparse, 2 or 3 interlocated ones. Legs short; fore femora much thickened, with a long bristle and two shorter ones on the inner side; fore tarsus with a curved tooth, which is variable in size.

Abdomen cylindical, segments 2-9 bearing on each posterior angle a knobbed, almost colorless bristle, which become progressively larger posteriorly; segments 7-9 bear in addition from one to three pairs of pointed bristles, two pairs of these on the ninth segment are much longer than the tube, a pair of knobbed bristles nearly or quite as long as the tube arises from the ninth segment adjacent to the base of the tube.

Male. Somewhat larger than the female; prothorax much smaller. General color brownish yellow, head, prothorax, and fore legs yellowish brown, pterothorax and middle and hind legs light brownish yellow with darker spots; abdominal segments 1 and 2 light yellow, 3, 4, 8, and 9 deep yellow, 3 and 4 with brownish anterior margins; 5 light brown, 6 dark brown, 7 yellowish brown, 5 and 6 forming a conspicuous dark band; tube brownish yellow. Fore wings banded with brown in the middle and at the tips; no interlocated hairs. Hind wings shaded with brown but not banded. Fore femora enlarged but much smaller than those of the female. Terminal bristles of the abdomen and of the tube much shorter than in the female. Labrum shorter, barely exceeding the remainder of the mouth cone. No tarsal teeth.

Described from two females and a male collected by Mr. C. A. Weigel at New Orleans, La., February, '22, from camphor infested with camphor scale *(Pseudaonidia duplex)*, and a single female and larva collected from camphor at New Orleans by Mr. W. W. Yothers, June 24, 1921. Type in the author's collection.

The

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A. H. BEYER .... *Business Manager*

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A CORRECTION. Thru an oversight the last number of the ENTOMOLOGIST was marked No. 3 of Vol. V instead of No. 4.

MOSQUITO CONTROL IN FLORIDA

A very valuable bulletin has just been published by the Florida State Board of Health. It is entitled "Mosquitoes and Mosquito Control," by Geo. W. Simons and Geo. F. Mosnette.

In a recent publication of the Russell Sage Foundation, "Survey of Florida County Jails," by B. C. Riley of the General Extension Division, University of Florida, the statement is made that "only half the jails have any screens." This is indeed a deplorable and dangerous condition of affairs. Not only is an unscreened jail a cruel injustice to the prisoners but also a constant menace to the health of the community in which it is situated. It could easily serve as a center of infection from which malaria might spread over the town.

MEETINGS OF THE FLORIDA ENTOMOLOGICAL SOCIETY

March 27. The Society met with the Horticultural Seminar in the office of the Nursery Inspector, Pres. Floyd of the Seminar in the chair. Members present: Berger, Burger, Floyd, Lord, Montgomery, Stone and Watson. Prof. Watson read a paper on the "Correlation Between Sunspot Maxima and Florida Freezes." This was followed by a general discussion. Dr. Burger discussed Current Notes on Plant Pathology with a review of Smith's "Bacterial Diseases of Plants." Mr. Goodwin was elected Business Manager of the ENTOMOLOGIST in the place of Dr. E. W. Berger, resigned. O. T. STONE, Sec'y Pro. Tem.

April 24. The Society met in the Plant Board offices with Pres. Stirling in the chair. Members present: Berger, Beyer, Brown, Lord, Merrill, Montgomery, Newell, O'Byrne, Stirling, Watson. Mr. Brown gave an illustrated paper on "Protecting Florida's Horticulture."

May 22. The Society met with the Horticultural Seminar, Dr. E. W. Berger in the chair. Major W. L. Floyd, Prof. of Horticulture in the University; Reginald Hart of the Plant Board, stationed at Ft. Lauderdale; Mr. Ed. L. Ayers, and Prof. J. S. Rogers were elected to membership in the Society. Mr. A. H. Beyer was elected Business Manager of the ENTOMOLOGIST. Mr. Ayers gave the paper of the evening on Bordeaux Mixture. He discussed the proper method of making the mixture and the causes of burning.

PERSONALS

R. N. Van Zwaluwenburg, entomologist of the United Sugar Companies, Los Mochis, Sinaloa, Mexico, was visiting Mr. Merrill, May 28. He was on his way to Cuba to collect parasites of the Sugar Cane Moth Borers.

The position of Extension Entomologist and Pathologist of the Agricultural Extension Division has been filled by the appointment of Mr. Ed. L. Ayers of Texas. Mr. Ayers has had much experience in Texas as Nursery Inspector and with commercial horticultural firms.

Prof. J. S. Rogers, head of the Department of Biology in the University, has left for Michigan on his summer vacation.

Mr. O. T. Stone of the Nursery Inspection Office has moved into his new house on West Union street.

ANOTHER APHID FROM GAINESVILLE

In connection with the host plant list of Gainesville aphids by Mr. Mason, published in our last issue, Mr. Geo. G. Ainslie calls our attention to *Carolinaia cyperi* Ainslie, the original description of which was published in the Canadian Entomologist March, 1915. This was collected from nut grass at Gainesville by Mr. Ainslie and is probably the species Mr. Mason records on page 23 as *Carolinaia sp.*

A LADY-BEETLE NEW TO FLORIDA

Mr. Geo. F. Merrill adds to the list of Florida Coleoptera the white lady-beetle *Olla abdominalis* Say. It was sent in from Tampa. Its range has hitherto been given as Indiana to Texas and west.

THE CORN LEAF-TIER, LEREMA ACCIUS S. & A.

(Continued from Page 4)

star, they do not overlap. In the first two instars the head is black, in the last two it is strikingly banded with white in the form of a narrow white band completely encircling the face on the margin and an inverted white V on each side of the face. In the last instar the vertex becomes reddish-brown. The third instar, however, presents both black heads and those striped with white as described for the fourth and fifth. This variation may be due to sex though this was not proven. Two larvae taken near together and having exactly the same head widths showed this difference.

As the larva prepares to molt the new head is formed within the body just caudad of the old one and shortly before the skin breaks there appear to be two distinct heads, even the markings of the new one showing through the epidermis. All the head casts are discarded unbroken except the last one which ruptures along the frontal suture. The pellicles of all except the last molt are very delicate and difficult to find. The larva is pale gray when freshly molted.

A day or two before pupation the larva becomes covered with a distinct while pulverulence. We have observed its first appearance as much as four days before pupation as two powdery white areas on the ventro-lateral margin of the body just caudad of the caudal pair of legs. From this point it spreads until the whole body is covered. It is all carried away with the last exuvium which remains attached to the head cast and is much more bulky than any of the preceding.

Twenty larvae were reared, nine of them completely through from egg to adult. The following table shows in days the length of the different instars and the total larval life.

No. of Larva	First instar	Second instar	Third instar	Fourth instar	Fifth instar	Total larval	Pupa stage	Prob-able egg	Total
*1							32		
*2					21		21		
*3							27		
4	7	5	8	17	10	47	16	9	72
5		6	12	13	13		13		
6	9	10	——26——			45	13	9	67
7							16		
8	——45——					45	12	9	66
9			9	6	24		16		
10	9	8	12	——14——		43	13	9	65
11	11	——23——		——13——		47	14	9	70
12	7	——22——		——16——		45	13	9	67
13	——14——		——17——		5	36	16	9	61
14	8	8	——23——			39	13	9	61
15			12	8			15		
16	8	13	——13——			34	12	9	55
17		8	7	—— 9——			14		
18			5	——11——			16		
19		8	4	——10——			11		
20		——25——					14		
Average	8.4	8.2	8.6	12	13	42.3	14	9	65

*These larvae were taken in Florida in November, 1912, and reared indoors at Nashville, Tennessee. They are not included in the averages.

When fully grown the larva covers a portion of the surface of a leaf with silk, suspends itself with a girdle about the thorax and pupates in a fold of the leaf, head downward in most cases. The larval skin breaks along the dorsal line from the head to about the second abdominal segment and is worked back by the pupa to its caudal extremity. The pupa is clear translucent green, 27 mm., long and 5 mm. wide. The anterior end is drawn out into a conical process 3 mm. long. The tongue lies in a straight slender case along the ventral side. Four or five days before emergence the wing pads and thorax assume an opaque whitish color, the eyes begin to darken and finally become deep purple. The body retains its pale color until a few hours before emergence when it rapidly darkens from the head caudad. The pupal case remains as a crumpled dingy-white skin attached to the leaf. The duration of the pupal stage is shown in the table on page 11. An individual reared at Brownsville, Texas, by Mr. R. A. Vickery remained 11 days in the pupa and Mr. W. R. McConnell noted seven at Greenwood, Mississippi, which emerged in from seven to thirteen days. The maximum reached under out-of-door conditions in Florida was 16 days and the lengthened pupal period of the individuals reared at temperatures greatly below normal at Nashville indicates some power of adaptation to unfavorable conditions in this stage.

The writer has not had the opportunity to follow this species throughout an entire year in the field and all the data at hand concerning its seasonal history are fragmentary. February 11 a first instar larva was found at Brownsville, Texas. June 3 a nearly full grown larva and June 17 a pupa were taken at Greenwood, Mississippi. As early as June 1 a larva nearly full grown, was found at Marion, South Carolina, and September 16 full grown larvae and pupae were found at Clemson College, in the same state, on corn growing in an open greenhouse used as an insectary and at the same place on September 25 on upland rice growing in the open. At Orlando, Florida, larvae survived the mild winter of 1912-13 which was unusually warm even for Florida, there being insufficient frost to injure corn growing in the open. Mr. McConnell attempted without success to carry larvae and pupae through the winter at Greenwood, Mississippi, where they were exposed to freezing, but not severe, temperatures. The great susceptibility to frost of the similar and closely related species, *Calpodes ethlius,* and the probable tropical origin of this species lead to the conclusion that it cannot survive severe freezing weather. If such be the case the butterflies must travel for long distances and very rapidly to reach so early in the summer the localities mentioned above. The larvae in the table on page 11 are arranged in approximate chronological order from November, 1912 to June, 1913, and the figures indicate that the time required for development becomes less as the season advances. At none of the points where this species has been noted do the records indicate any distinct generations, furnishing further support to the theory of its tropical origin; for definite seasonal habits with long quiescent periods, little or not at all affected by outside influences, are evidence of a long course of adjustment to conditions as found in the temperate zone.

In the spring of 1913 the generations were not distinct, for eggs and larvae of all sizes were found at the same time. The time required for the development of a generation, 65 days not including the time required for mating and oviposition after emergence, indicates that there may be several generations in Florida in one year, and at least two as far north as the species is likely to go. It is probable that it is a continuous breeder in its permanent range and that it travels northward every summer and is killed back every winter as is the case with several others of our economically important insects. However, the fact that *Calpodes ethlius* has reached and caused damage at Washington, D. C., may indicate similar possibilities for this species.

The original account gave American wisteria *(Bradleya frutescens* (L.) Britton) as the food plant but a note adds that it "is most commonly to be met with in the chrysalis state on the blades of Indian corn, *Zea mays,* in which it enfolds itself." Chapman found larvae in the leaves of *Erianthus alopecuroides* (L.) Ell. at Apalachicola, Florida. McConnell found several larvae feeding on sorghum at Greenwood, Mississippi, and one on a grass locally known as "tumble grass," probably *Panicum capiliare,* at Memphis, Tennessee. The writer found larvae feeding in leaves of upland rice on the grounds of the South Carolina Experiment Station at Clemson College and a single one in a rolled leaf of Johnson grass *(Sorghum halepense)* at the Florida Experiment Station at Gainesville. All other records give corn as the food plant. Further observations are required to determine the possible food plants but, among cultivated crops, corn will probably head the list.

Three species of parasites have been reared, one from eggs and two from larvae.

Xenufens ruskini Gir. Of eleven eggs taken on corn leaves at Orlando, January 28, two were mottled and darker than the rest. On February 10 they had become very dark and on the 20th 12 minute hymenopterons emerged from one egg, and on the 25th, 10 from the other. They left through a small hole in the apex. The empty shell retained its mottled appearance. Another egg in the same lot appeared normal until February 4 when the shell showed faint mottling which slowly increased until 12 adult parasites emerged on March 10, 42 days after the egg was collected. Eggs of *Calpodes ethlius* occurring in large numbers on canna leaves at Orlando on February 17 were found to be almost 100% parasitized and though most of the parasites had emerged, enough were obtained from the several dozen eggs collected to determine them as the same species attacking the eggs of *Lerema accius*. The parasite was described by Girault* from specimens reared from eggs of *Eudamus proteus* taken in the same vicinity and at the same time it was found attacking the eggs of *Lerema accius*.

Microdus sp. A small dwarfed larva of *Lerema*, taken in the field at Lakeland, April 10, gave forth on the 15th a hymenopterous grub which, after spinning a few threads, pupated in a corner of the box in which its host had been confined. The pupa was 8 mm. long, naked, white except for the eyes and ocelli which darkened as development proceeded. On the 24th the thorax turned yellow, and the adult emerged on the 26th. The adult, which proved to be a female, had a reddish-brown head and thorax, yellow abdomen and black wings.

Euplectrus insuetus Gahan. An undersized yellowish larva taken in the field at Lakeland, April 10 almost at once gave forth 16 white grubs which moved a few millimeters from the dead body of their host and transformed to naked pupae attached to the bottom of the box with their ventral sides uppermost. On the 23rd the adults, small Chalcids, emerged. They are black except for the dark eyes and the legs and cephalic half of the abdomen which are pale yellow. From this material the species was described by Mr. A. B. Gahan† as new.

Investigations during the more entomologically active part of the year would undoubtedly reveal more parasites concerned in the control of this species and it seems likely that the ordinary scarcity of the larvae may be attributed to parasitic agency.

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*Ent. News, Vol. 27, p. 6.
†Proc. U. S. N. M. Vol. 48, p. 164.

CONSIDER THE FLY

The tops of the maples are red with buds; the warm forest glades are dotted with violets and white forget-me-notes *(Houstonias)*; an occasional sedge, and in the more sunny spots the Sheep Sorrell *(Oxalis)*, are in bloom; and in the deeper shade the Twin Flower. It is early spring. (January 15.)

And as we rest here in this sunny glade in the forest Muscus domesticus comes to keep us company. In our towns we call him the "Typhoid Fly" and hire sanitary officers to deal with him, to wage unceasing war against his young. In our dwellings we call him the "House Fly." We screen against him. We trap him. We poison him. We swat him. But here in the woods he is a harmless, sociable fellow—and so hardy!—the first insect to crawl out on a cold morning, a real harbinger of spring. He does not bite like his cousin the Stable Fly. And why blame him for carrying our filth about? It is we who furnish him with his germs. Like too many of us humans he has been spoiled by too much "civilization." Clean up our towns and barns and he would cease to be a menace. Would he cease to exist? Probably not, for I read that on some barren South Pacific island, where the only vertebrate animal to furnish him manure is a species of rat, he is present in abundance. Verily he is a hardy rascal.

THREE SCALES NEW TO FLORIDA

Mr. Geo. Merrill has recently added to the list of the scale insects of Florida three species, as follows:

Gymnaspis aechmeae Newst. was collected from Bromeliaceae at Little River by Mr. Jeff Chaffin. It has also been taken at Gotha.

Targionia sacchari (Ckll.) was taken from sugar cane at Miami by Mr. E. L. Kelly.

Lepidosaphes camelliae Hoke—Camellia Scale. On Camellia Japonica. From Oneco to Tallahassee, Alabama, Georgia and Mississippi.

WHAT'S IN A NAME? SOMETIMES CONSIDERABLE

A recent correspondent expresses himself as follows concerning the new fumigant for borers in peach trees: Paradichlorobenzene.

"Say, why couldn't the inventor have simply named the stuff 'borer assassinator'; or, if he had to have a long name for it, called it "Sickhimandgoinyourlengthandgethim benzene'? And then we laymen could analyze the name."—C. A. Finley.

The Florida Entomologist

Official Organ of the Florida Entomological Society

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SEPTEMBER, 1922

NEW SPECIES OF CICADELLIDAE FROM THE SOUTHERN U. S. (Homoptera)

HERBERT OSBORN

Deltocephalus limicolus, n. sp.

Dark gray with fuscous markings; numerous reticulate lines and cross nervures on the eytra. Length, female 3.75 mm; male 3.6 mm.

Head wider than pronotum; vertex wider than long, one-half longer at middle than next the eye, obtusely angulate; margin subangulate to front; front broad, lateral borders curved; clypeus with sides nearly parallel; cheeks broad and deeply sinuate. Pronotum as long as vertex, truncate behind; scutellum small; elytral venation irregular, the clavus with numerous irregular reticulations, and the anteapical cells broken by irregular cross veinlets.

Color: Gray; vertex ivory whitish with four dots on the anterior border, two lunate spots midway and two rounded ocellate spots on the hind border, fuscous. Pronotum fuscous with five gray stripes, the inner three connected by cross-band near the front; scutellum with ivory spots each side; elytral veins and veinlets mostly ivory white, the areoles mostly fuscous, the first apical areole densely black, the others with whitish centers bordered with smoky; front pale fuscous with transverse whitish arcs and a central whitish line; clypeus dull white with smoky borders; lorae light yellow, with dusky margin; cheeks dull gray, legs fuscous, banded and striped with dull white; abdomen beneath blackish, the borders of segments and the outer part of pygofer lighter.

Genitalia: Female, last ventral segment short; hind border truncate or slightly concave; pale whitish, bordered with fuscous; side plates conspicuous. Male, valve short, transverse, broadly rounded behind; plates broad at base, narrowing rapidly, terminating in acute thin slightly upturned tips not attaining the tip of the pygofer.

Numerous specimens were collected at St. Petersburg, Fla., February and March, 1921, on a creeping succulent plant growing in a tidal flat and associated with fiddler crabs and snails. Type and paratypes in author's collection. Superficially this species bears some resemblance to *arundineus*, but the details of the color pattern are different, the body is more robust, and there are distinct differences in the genitalia.

Deltocephalus fusconotatus, n. sp.

Ivory whitish with numerous fuscous spots on pronotum, scutellum and base of elytra. Length, male 3.5 mm.

Head slightly wider than pronotum; vertex as long as width between the eyes, one-half longer at middle than at eye, margin acute toward the apex; front narrow, tapering gradually to base of clypeus; clypeus long, nearly twice as long as wide, sides nearly parallel; lorae short, distant from border of cheek; cheeks broad, distinctly sinuate beneath the eye. Pronotum as long as vertex; scutellum acuminate at tip; claval veins merging near base, middle anteapical cell divided by merging of veins.

Color: Light gray or ivory white; vertex bordered anteriorly with black, except at extreme tip; the outer part of the black line enclosing the ocellus. Pronotum with three somewhat diffuse spots, scutellum with two dots on the base, elytra with a basal dot and a dot before and back of the merged veins, a costal spot near the base, another before the nodal vein and the apical cells, fuscous or blackish; face with base of front densely black, the remainder of front with clypeus, lorae and lower part of cheek, white; a large squarish spot below the eye, reaching antennal pit, black; thorax and abdomen white with a black dot on the pleural pieces, a black band at apex of femora, and black dots on the hind tibiae, and black rings on the hind tarsi.

Genitalia: Male, valve narrow, rounded behind; plates small triangular, about one-half the length of pygofer.

Described from a single specimen, collected at "Cameron, La., Aug. 14-28, 1903", by Prof. J. S. Hine.

This is a handsome little species, somewhat resembling *arundineus*, but differing so much in the color pattern, especially on the face, that it seems impossible to refer it to that species. There is also a distinct difference in the male genitalia.

Lonatura notata, n. sp.

Pale straw color, with numerous black dots on pronotum, elytra and abdomen. Length, female 4 mm; male 3.5 to 3.75 mm.

Head slightly wider than pronotum, distinctly produced, subconical; vertex somewhat flattened, but convex, as long as width between the eyes, nearly twice longer at the middle than next the eye; front narrowing rather abruptly to clypeus; clypeus broad, about one-half longer than width at base, scarcely widened at the middle; lorae elongate, the tips distant from border of the cheek; cheeks narrow, the margin sinuate beneath the eye. Pronotum about three-fourths as long as vertex, hind border slightly concave; scutellum small, short; elytra scarcely reaching base of abdomen, hind border truncate, leaving entire upper surface of abdomen exposed.

Color: Light straw; vertex with three pairs of faintly fuscous spots; two dots on the anterior border, a larger spot at the lateral border, two dots at base of scutellum, a large dot on clavus, a similar one at middle of hind border of elytra, and eight series of dots on the abdominal segments, a dot on anterior femora, a line on the hind femora, dots on the hind tibiae and tarsal claws dark fuscous or black.

Genitalia: Female, last ventral segment short, concave behind, with a central broad tooth notched at the apex; ovipositor scarcely exceeding the pygofer. Male, valve short, rounded behind; plates small, triangular, acute at tip, reaching half way to end of pygofer.

Described from specimens collected at St. Petersburg, Fla., March 5, 1921. Type and paratypes in author's collection. I have also taken specimens at Ocean Springs and Pascagoula, Mississippi, during February, 1921.

The species occurs in the flat-woods association on native grass, and is probably a grass feeder. Numerous black dots on the upper surface seem to be a distinctive character. Only short-winged forms have been noted, so that the venation of long-winged forms, if they occur, has not been seen.

Euscelis (Athysanus) **fumidus** n. sp.

Somewhat like *magnus* but much darker, smoky black, the entire surface appearing suffused with a deep brown-black color. Length, male 6.25 mm.

Head wider than pronotum, vertex short, scarcely longer on middle than next the eye, very obtusely rounded to front, front broad, subangulate at antennae, narrowed abruptly to clypeus; clypeus nearly twice as long as wide, cheek broadly rounded below the eye. Pronotum distinctly transversely striate. Posterior border shallowly concave.

Color: Dark fuscous with small obscure yellowish irrorations; vertex lighter, yellowish with fuscous irrorations; front lighter above, darker below with obscure pale arcs; clypeus nearly black; lorae and cheeks blackish smoky, the whole irrorate with minute yellowish dots. Pronotum scutellum and elytra blackish with minute yellowish dots. Legs blackish with spines somewhat lighter, venter blackish with a central row of light dots.

Genitalia: Male valve small, short, obtusely angulate behind; plates small elongate triangular, tips acute, black, with a row of lighter bristles on the margin.

One specimen, male (type) of this peculiar species from Chester, Ga. This has the appearance of a *Phlepsius* and might be considered as related to *P. latifrons* but it is evidently congeneric with *magnus.* It is distinctly different from this species in the absence of the white band on the pronotum and the white costa, as well as in the intense pitchy black color. If an extreme form of *magnus* it will have to be recognized as a distinct variety.

Euscelis (Athysanus) **drakei,** n. sp.

Related to *magnus* and *fumidus* with a yellowish band behind the middle of pronotum and four milky spots on elytra. Length 6.25 mm, 6 mm.

Head wider than pronotum. Vertex very short, margins parallel; disc convex rounded to the front; front convex except slight depression at base, front about as broad as long, suture below ocellus distant from eye, obtusely angled at eye; clypeus tip scarcely wider than base; lorae rather broad, not reaching margin of cheek; cheek broad, sinuate below eye; pronotum broad; anterior margin broadly arcuate, hind margin slightly concave, lateral margin flaring and sharply carinate. Elytra densely reticulate, somewhat rugose, scarcely exceeding tip of abdomen.

Color: Smoky brown to fuscous. Vertex tawny with minute fulvous dots; upper portion of face like vertex; front below minutely dotted with tawny; arcs faintly indicated; cheeks darker on the margins. Pronotum dark brown to fuscous; posterior border somewhat darker, with a broad yellowish band behind the middle, the whole minutely sprinkled with tawny dots. Scutellum tawny with yellow dots. Elytra smoky, minutely dotted with fuscous; two white patches on the middle of clavus and two on the inner anteapical cell, the anterior just below claval spot.

Genitalia: Female, last ventral segment scarcely longer than penultimate; posterior border sinuous, the middle third and lateral lobes produced; minutely notched on middlle, lateral lobes rounded.

Described from two spemines, females, (type and paratype) collected at Gainesville, Fla., by C. J. Drake. Type in Osborn collection, Ohio State University.

This species is very close to *magnus* O. & B. but aside from the conspicuous transverse spots on the elytra, the costa is not white and the female segment differs in form.

Euscelis (Athysanus) **magnus** var **piceus**, n. var.

Similar to *magnus* of typical form but with the coloration, except for the white band on the pronotum and the costal border, of a deep pitchy black and the female sgment with median notch much smaller. Collected by Mr. H. L. Dozier at Pascagoula, Miss., Aug. 8, 1921.

Mesamia nervosus, n. sp.

Light yellow; vertex with an interrupted submarginal black border; elytra with fuscous veins; five or more conspicuous cross veinlets in the outer costal area. Length, female 4 mm.; male 3.5 mm.

Head slightly wider than pronotum; vertex nearly twice as wide as long, rounded in front, about one-fourth longer at middle than next the eye, distinctly angular to front; front narrowing nearly uniformly to base of clypeus; clypeus narrow, nearly twice as wide as long, slightly widened toward the tip; lorae rather narrow, with tip nearly reaching to the margin of the cheek; cheek slightly sinuate below the eye. Pronotum two-thirds longer than vertex, slightly concave behind; elytra with cross veinlets in outer claval and costal cells; two cross veins.

Color: Vertex, pronotum and scutellum yellow tinged with green, vertex with a conspicuous submarginal band interrupted at the middle behind which is a fainter fuscous band in the female, scarcely apparent in the male; disc of pronotum darker; elytra hyaline, the veins conspicuously dark fuscous or black, the cross veinlets of costa widening on the margin; apical broadly blackish; beneath, face yellowish-green, a narrow black line bordering the base of front; abdomen greenish, the segments above with black spots or bands.

Genitalia: Female, last ventral segment about twice as long as preceding; apex broadly rounded with a faint notch at middle; male, valve short, rounded behind; plates triangular with acute upturned tips; the disc marked with a distinct impression paralleling the outer border.

Described from a female, (type) Sept. 27, 1921; and male, (allotype) Sept. 9, 1921, collected by Mr. F. E. Guyton, Auburn, Alabama.

Also one female, (paratype), from Keatchie, La., June 14, 1905. This latter differs from the type in having a less distinct second band on the vertex, a more distinct yellow color to the pronotum, but otherwise is so similar that it seems impossible to consider it a distinct species.

These specimens approach most nearly to *Mesamia stramineus*, Osb., but have a different shaped vertex and much more distinct venation.

ADDITIONS TO THE THYSANOPTERA OF FLORIDA. X

J. R. WATSON

54. Megalomerothrips eupatorii Watson.

Male. The female only of this species was originally described. (Fla. Buggist, Vol. II, No. 3, Feb. 1919). We now have the male also. Much darker in color than the female, almost jet black. Fore tarsus with a very large, slightly curved spine, 27 interlocated bristles on the fore wing. Taken from the burrow of a cerambycid in a dead twig of avocado, Winter Haven, Oct., 1921. An additional female was collected by Dr. E. W. Berger in one of his colonies of cottony cushion scale. It may be predaceous.

57. Dictyothrips floridensis Watson.

Male. Considerably lighter in color than the female. Light brown with traces of bright red hypodermal pigment. Abdomen very slender, darker than the thorax. In the integument on the dorsal side of segments 2-7 are numerous large pellucid dots which occupy about ¼ the surface. These peculiar dots seem to be entirely absent from the females.

Larvae light yellowish brown with much red hypodermal pigment.

Described from several males and larvae.

In addition to the type locality in the Plant Introduction garden at Miami, this species has been collected in the Plant Introduction Garden at Brooksville by W. B. Wood and H. L. Sanford of the U. S. Horticultural Board. In addition to the original host, Guava, it was taken on *Passiflora sp., Rubus sp., Arracacia xanthorihisa,* and *Prunus sp.* Since it has been found only in the Plant Introduction gardens and its nearest relative is a native of Mexico, it would seem quite probable that this is an introduced species.

74. Heliothrips phaceoli Hood.

Abundant on Kudzu on the Station grounds, Gainesville, June, 1921.

75. Haplothrips gowdeyi Hood.

In Bidens blossoms, Ft. Myers, March, 1922. Hitherto known only from the West Indies.

76. Haplothrips humilis Hood.

On compositae. Ft. Myers, March, 1921. Another southern species not hitherto found in the United States.

77. Haplothrips merrilli Watson.

This species, described from specimens taken from cocoanuts from Cuba, (Fla. Entomologist, Vol. IV, No. 1), was found by the writer under the cap scales of cocoanuts at Ft. Myers, March, 1922.

78. Idolothrips tuberculatus Hood.

A male of this species was beaten from basswood *(Tilia americana)* at Gainesville, April 14, 1922.

(Mr. H. L. Dozier has specimens of Idolothrips armatus collected at Prairie, Miss., June 17, 1921, and Batesburg, S. C. It is quite probable that this species also occurs in Florida.)

79. Zygothrips floridensis n. sp.

Color: Light yellowish brown with much purple hypodermal pigment.

Measurements: Total body length 1.2 mm.; head, length 0.20, width 0.15 mm.; prothorax, length 0.11, width 0.21 mm.; metathorax, width 0.24 mm.; abdomen, width 0.21 mm.; tube, length 0.10, width at base 0.06, at apex 0.027 mm. Antennae: Segment 1, 24; 2, 44; 3, 67; 4, 56; 5, 46; 6, 40; 7, 44; 8, 27 microns; total length 0.36 mm.

Head: 1.3 longer than wide, vertex rounded, striate towards the posterior margin; frons elevated; head widest just above the base; cheeks slightly convex, bearing a few short hairs; postocular bristles short, reaching but little past the posterior margins of the eyes. *Eyes* rather large, slightly protruding; red by reflected light, black by transmitted; non-pilose; facets large. *Ocelli* large, yellow, bordered with dark crescents; situated on the elevated frons, the anterior directed forward, the posterior pair widely separated, opposite the anterior third of the eyes from whose margins they are well separated. *Mouth-cone* short, reaching about half way across the prosternum; rounded at the tip. *Antennae* 1.8 times as long as the head; dark brown except most of segment 3, basal half of 4, and the extreme base of 5 which are a lighter, yellowish brown, segment 3 long and narrow. All bristles very small. Sense cones somewhat larger but colorless and inconspicuous.

Prothorax little more than half the length of the head, nearly twice as wide as long; trapezoidal; a prominent bristle on each posterior angle. These bristles have pale, dilated tips, all others are sharp pointed.

Pterothorax with sides nearly parallel; upper surface striated. Wings moderately long; membrane quite markedly constricted above the middle, colorless except for a trace of brown at the extreme base of the primaries, fringed with comparatively few and short hairs, four interlocated ones on the primaries. Legs rather long and slender, concolorous with the body except the fore tibiae which are paler, fore femora not swollen, no spines on the basal segments of the tarsi; hind tibiae each with a very thick, heavy bristle near the end.

Abdomen rather long and slender, anterior segments with three or four prominent bristles on each side, the median one or two sigmoid; on the posterior segments these become curved but not sigmoid; a pair on the ninth segment considerably longer than the tube. Tube rather wide for its length; terminal bristles much longer than the tube. Male not seen. Described from a single female taken by Mr. Geo. B. Merrill from an unknown shrub collected at Elfers by Mr. C. P. Sheffield, March, 1922. Type in the author's collection.

80. **Hindsiana cocois** Watson.

This insect was recently (Fla. Entomologist, Vol. V, No. 4, April, 1922) described from specimens collected from cocoanuts from Cuba taken from quarantine at Key West. Mr. Mosnette has sent us five larvae taken from under scales of cocoanuts at Miami, and Mr. George B. Merrill has collected a half dozen specimens from a mango from Oneco, Fla. As in the case of the other specimens, they were associated with scale insects. The insect is probably predaceous.

81. **Cryptothrips laureli** Mason (Ent. News Vol. XXXIII, No. 7).

The Bay Thrips. On all species of the genus *Tamala* in Central Florida from Frost Proof to Daytona. It probably occurs throughout Northern Florida but seems to be absent from the bays on the lower East Coast. Closely related to the Camphor thrips with which it was long confused.

36. Symphothrips punctatus Hood and Williams.

Oneco, Fla., July, 1922, on mango infested with scales and Septobasidium, George B. Merrill, Coll. This species has been taken at Key West from under the cap scales of cocoanuts from Cuba. Originally described from Orlando.

82. Hoplanddrothrips funnebris Hood.
"Fla." Hood '17, P. 63.

83. Hindsiana cocois Watson.

Orginally described from Cuba (Fla. Entomoligst, Vol. 5, No. 4, April, 1922, P. 66). Collected from mango, Oneco, Fla., by Mr. Jno. W. Collins.

THE GREENHOUSE THRIPS OUT-OF-DOORS IN NORTH-EASTERN GEORGIA

In August and early September the editor spent a fifteen days' vacation in Rabun County, Georgia, mostly collecting thrips. The most surprising capture was that of *Heliothrips haemorrhoidalis*, the green house thrips, from a wild shrub growing along a stream near Clayton. With the exception of the southern end of Florida (about Miami) this insect, in the United States, has never before been taken outside of greenhouses or in the immediate vicinity of greenhouses during the summer. But there are no greenhouses within many miles of Clayton and no houses very near the place of capture. The place and circumstances of its capture leave no doubt that it is living out of doors there the year around and point strongly to it being a native of the region.

Rabun county is in the northeastern corner of Georgia and this thrips was collected within seven miles of the North Carolina line and at an altitude of about 2000 feet. The vegetation and doubtless the climate of Rabun county is comparable to that of Southern Ohio. If this thrips can live out of doors in Rabun county, Georgia, it should, as far as cold is concerned, be able to do so over a large portion of the United States.

It is, of course, more common in the tropics, and it is supposed to have been introduced into northern greenhouses on plants brought from the tropics. Evidently its native range extends much further north than we have hitherto suspected and, perhaps, instead of being imported from the tropics, it originally entered the greenhouses from some local wild host.

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ENTOMOLOGY AT THE AGENTS' MEETING

The eleventh annual conference of the county demonstration agents was held at the University from September 7 to 14. There were four scheduled talks on entomological subjects and much discussion during committee meetings, laboratory and informal conferences.

Mr. W. W. Yothers outlined the life history of the rust mite. At least 90% of them complete their life cycle, from egg to egg in nine days. Exposure to sulphur kills them in fifteen seconds.

A very live topic was that of dusting citrus trees for the control of rust mite. Mr. DeBusk spoke of the results of some dusting done in his county in cooperation with the Experiment Station. The control on the dusted plots was as good as on the sprayed plots and the cost was only about one fourth that of spraying. Mr. Kime thought it might be necessary to dust two or three times to secure as good a control as with spraying. Other agents spoke of the satisfactory results of dusting in their counties. Of even more importance than the cheapness of dusting as compared with spraying is the rapidity of the operation. In large groves, even tho spraying may be started at the first sign of danger, much damage may be done before the entire grove can be covered. Another point which might have been mentioned is that of safety. Much fruit was burned last year as a result of spraying during hot weather. Mr. Yothers reported as good results from the use of straight flowers of sulphur as with the mixture of sulphur and lime.

Mr. Yothers spoke of the work done at his laboratory on the entomogenous fungi by Dr. Spear. He came to the conclusion that the Red Aschersonia was spread mostly by the whitefly crawlers. This points strongly to the conclusion that the best time to apply the fungus is when the maximum number of crawlers are out, i. e. about a week after the culmination of the June flight of adults. The yellow aschersonia, however, should accordingly, be applied about the middle of July. The same principle applies to the scale-infesting fungi. They should be sprayed on the trees when the maximum number of scale crawlers are out.

Mr. A. C. Brown spoke on sweet-potato certification.

The committee on truck crops reported the control of aphids to be one of their most serious problems.

RELATION OF ENVIRONMENTAL FACTORS TO WING DEVELOPMENT IN APHIDS[1]

By ARTHUR C. MASON

The generally accepted theory of most entomologists and experimenters on the subject is that winged forms of aphids are produced only when the continued existence of the apterous forms, under conditions then existing, might prove disastrous to the species. This occurs always in the fall in cold climates when sexual forms are produced, the males of which are usually winged, and also at any migrating season in the case of those species which live on two or more different host plants. There are also many other causes attributed to these adaptive variations. Among the factors which may be potent in acting as effective stimuli for wing formation are crowding on the host and hence lessening of the food supply, unusually high or low humidity, early lowering of temperature in autumn, changing constitution of the sap of the plants by chemical means, etc.

In collecting aphids it was noted that usually both winged and apterous forms occurred in the same colony; also, in the life history work with *Myzus persicae*, that some of them would be winged and others apterous. In several cases plant lice which were apterous when collected would develop wings when kept in the laboratory for a day or two. The question often arose as to why some of these forms were winged and some apterous when living under the same conditions, and as to whether the environment of the aphids in the breeding jars had an effect on this. Hence a series of experiments was planned to prove or disprove some of these theories.

[1]A synopsis of Part III of thesis entitled "Systematic and Biological Studies of Some Florida Aphididae", presented by the writer in 1915 to the University of Florida for the degree of Master of Science. This is the third and concluding paper of the series.

Species Used. For carrying on these experiments the following three species of aphids were mostly used: *Lachnus pini* L., *Myzus persicae* Sulz., and *Aphis gossypii* Glov. These aphids could be found in greater or less abundance at all times of the year and both winged and apterous forms occurred naturally in the colonies. They continued to reproduce viviparously all through the winter and hence a supply of adults could always be obtained. The last two species lived on a number of different host plants and so could be raised under varying conditions. Another species, *Macrosiphum davisi*, had been observed for a year on the rose bushes and no winged forms ever occurred. Hence some work was done to try to produce some individuals with wings.

EFFECT OF INJURY TO HOST PLANTS

Starting out with what appeared to be the most promising methods of securing results, some experiments were run to determine the effect of injury of the host plant on the aphids. For this work some small pine trees infested with *Lachnus pini* were selected. The object was to injure the branches by girdling or partial girdling so as to shut off the flow of sap in the branch and determine the effect on the aphids.

Branch A was injured by cutting the bark and cambium layer for one-third of the distance around it; branch B had the bark cut through the cambium layer for two-thirds of the distance around; branch C was a check, uninjured. On each of these branches was placed a small colony of *Lachnus pini* in a cage. Another small tree was completely girdled around the base and a colony placed on it in a manner similar to the others. This colony is designated as D. A third tree was uninjured and a colony placed on it for a check, designated as E. These experiments were begun in November and were run for about two months, the results being recorded two or three times a week. The number of winged forms found each time were counted and the results tabulated.[2] The table shows that winged forms were produced in all the cages. On the first tree check colony C had approximately as many winged forms as colonies A and B which were on injured branches. Colony D also had a large number of winged forms but check colony E for a few weeks produced only apterous forms. Later on, however, winged ones appeared.

[2]The tables are necessarily omitted because of lack of space and instead the results are summarized. The photographs illustrating the work are also excluded.

A little later the experiment was repeated. Colony F was placed on another uninjured tree and colony G on a small tree which was girdled in a manner similar to the tree in the previous experiment. Colonies H and I were checks on uninjured branches of another tree. These were carried on as the previous experiments for several weeks with no decided results on wing production by injuring the host plant. The checks produced winged aphids about as consistently as did the injured limbs. Check colony E appeared for a time to be an exception to this rule, and it was thought that the tree on which they were living might be the cause of this. Consequently some of the apterous aphids from colony E were taken out and three new colonies started from them. Colony J was placed on a branch near A and B on tree No. 1, which had produced winged forms; colony K was placed on a limb of the girdled tree No. 4 by the side of colony D which had also produced winged forms; and colony L was moved to a new limb of tree No. 5, near colony E, for a check and to counteract any effect of moving the aphids to other trees. As the results show, winged aphids were produced not only in each of these three colonies, but also a little later in the original colony E.

About two months after being girdled one of the trees was turning very yellow from the effects. Therefore, two colonies of aphids were placed in cages on limbs of this tree, and two other colonies were placed on limbs of a healthy tree, as a check. All four colonies were taken from the same colony containing both winged and apterous forms. Here, also, during two months' time, winged forms were found in the checks in about the same ratio as in the colonies on the girdled tree. Therefore, the unhealthy condition of a pine tree due to girdling or any change which it may cause in the sap of the tree will not cause the aphids on it to produce wings in increased numbers over those on healthy trees.

Effect of Crowding on Wing Production. In many colonies it was observed that no winged forms appeared until several days after the colony was started, or until it had increased in size and often covered the limb thickly. Consequently the question arose as to whether or not the large number of aphids there caused the production of wings, either directly, or indirectly, by lessening the food supply. To investigate this point two colonies were started on a girdled tree. The first one, colony M, was placed on a limb of this tree on December 11 and allowed to grow. A week later another small colony, (N), taken from the same place as the others, was placed on another limb. Colony M had a start on colony N and should be more numerous and show any effects of crowding sooner than N. The results show no difference. In fact colony M produced winged forms before N was even started and while there were only a few aphids there, and continued to produce them as long as the colony lived there. Therefore crowding as a probable cause of wing production was given up.

Effect on Myzus persicae of Injuring Cabbage Plants. This experiment was tried in the greenhouse insectary and its object was to see if unfavorable conditions of growth for a cabbage plant will cause aphids of the species *Myzus persicae* growing on it to produce wings and seek a new plant. Twelve potted cabbage plants were placed on the bench and covered with lantern globes, and divided into three groups. The first four had a cord tied lightly around the stem which would shut off the flow of sap to some extent. The next four were given no water and allowed to dry up. The third four were kept in a normal condition and used as checks. Each of the plants had a number of aphids placed on it and left for two weeks, the results being recorded each day or two. As the table shows, winged forms were produced on all of the plants without discrimination. In fact the total number on the four plants of each group is about the same. The results, therefore, do not argue in favor of the unhealthy condition of plants causing wings.

Mature Aphids. Eight adult apterous *Lachnus pini,* which had already produced some young, were placed on a cut stem which had already become partially dried out. All died in less than a week and produced no wings. It is hardly reasonable to believe that an adult could develop wings.

EFFECT ON APHIDS OF ADDING CHEMICAL SOLUTIONS TO THE FOOD OF THE HOST

Some experiments were next run to determine if changing the sap of the host plant by adding chemical solutions to its food would cause aphids on it to produce wings in order to seek a new host. Some of these chemicals would undoubtedly be taken up by the plant and consequently added to the dietary of the aphids. First, some cabbage plants which were infested with *Myzus persicae* were watered with solutions of magnesium sulphate of varying strengths. Small pots were filled with clean white sand and some small cabbage plants, whose roots had been washed clean of all earth, were placed in them. The object was to remove all plant food, as far as possible, and give the plants nothing but what was in the solutions added. The plants were placed under lantern globes in the laboratory and divided into four groups of two plants each. One lot was watered with a 1% solution, one with a 5% solution and one with a 10% solution of magnesium sulphate, and the other with distilled water for a check. The sand was kept moist by watering every day and the results recorded daily. The 5% and 10% solutions were found to be too strong and the plants soon died. Some winged forms were found on all but two of the plants however.

The experiment was then repeated, this time using three per cent solutions which would not affect the plants so quickly. Eight cabbage plants were cleaned and potted as before and divided into four groups. One group was watered with a 3% solution of each of the following: magnesium sulphate, sodium chloride, tannic acid, and one group with distilled water for a check. In no case did the plants live more than a few days. They soon began to turn yellow, probably from lack of food, and consequently the aphids left them and started wandering around and died. As the table shows, wings were produced in some of them, but without much consistency. Although the checks produced no winged forms, one plant in each of the other groups showed none also. The experiment did not run over a long enough period to be conclusive. There was not sufficient time for the aphids to mature and show the effects of the chemicals. Besides we cannot prove that the plants took up any of the chemical solutions added, since the roots have the power of discriminating between the available foods. Therefore some attempts were made to rear them on cut stems in chemical solutions.

Experiments with Cut Stems. Eight young orange tips were cut from a tree and placed in small pots of clean white sand which were covered with lantern globes and set in the greenhouse on a shaded bench. On each of these cuttings were placed a number of aphids of the species *Aphis gossypii.* Two of them were watered with a 3% solution of each of the following chemicals: magnesium sulphate, sodium chloride and citric acid; and two were watered with distilled water for checks. The results were recorded as long as the cuttings kept fresh and the aphids lived on them. However after a few days the leaves wilted and dropped and the aphids began to die. Some winged ones were produced on all but one of the cuttings, but with no regularity.

A little later the experiment was repeated, this time with *Myzus persicae* on orange cuttings. The cuttings were prepared as described above. Three or four dozen aphids were placed on each and watered with the same solutions as above and in the same order. The results as recorded show that wings were found in all but one, a cutting watered with sodium chloride solution. This cutting did not last very long before the leaves turned brown and dropped. In fact the cuttings watered with the chemical solutions showed the effects sooner than the checks in all cases. In this experiment the checks produced more winged specimens than any of the others except those watered with magnesium sulphate which produced about an equal number. Possibly this can be explained by the fact that the cutting did not wilt so quickly and hence more of the aphids had an opportunity to mature. At any rate, the wilting of the stems or the effect of the chemicals cannot be said to produce wings.

Lachnus pini on Pine Cuttings. Four branches were cut from a pine tree and placed in bottles one each containing a 3% solution of magnesium sulphate, sodium chloride and citric acid and distilled water. On each of these branches were placed about four dozen immature aphids of *Lachnus pini* which were allowed to mature. The mouths of the bottles were plugged with cotton and the whole bottle and stem covered over with a bell jar. Results show that in all cases except the check a majority of the aphids died while still immature and in the check also a large number died before becoming adult. The greatest mortality was noted on the stems kept in sodium chloride and citric acid. The leaves soon began to dry up there and the aphids died. In all cases however some winged ones were produced but most in the check. Here also we can say this is due to the fact that more of the aphids lived to become adult on the check.

Injections of Chemicals into Plants. To make more sure of getting the chemicals into the sap of the plant and thus adding them to the food of the aphids, they were injected into the growing stems with a hypodermic needle. This method was used on both cabbage plants and orange trees. Eight growing healthy cabbage plants were potted and placed under lantern globes in the open-air insectary. The same chemicals as used above were injected into the stems. In two each was injected magnesium sulphate, sodium chloride and citric acid, in one distilled water and in one nothing. On each of these plants were placed twelve immature specimens of *Myzus persicae* about one week old. The plants were watered and kept in a healthy condition, and the aphids were allowed to mature there. The results show a few winged ones for each of the solutions, but not conclusive in favor of the chemicals. On one plant of each group all matured apterous.

The same experiment was later tried by injecting some of each of these chemicals into young orange tips and tying up in each twelve immature *Myzus persicae*. Chemicals in same order as above. Here, also some winged ones were produced in each case, but most in the checks.

Trials with Rose Aphids. A species of green rose aphid, probably *Macrosiphum davisi,* had been watched for over a year on rose bushes and no winged specimens were ever seen. Therefore an attempt was made to produce wings on some of them. Three cuttings of rose were made and placed in sand and watered: No. 1 with 1% magnesium sulphate, No. 2 with 5% magnesium sulphate, and No. 3 with water. On each cutting was placed several of the rose aphids. The rose cuttings however only remained fresh for a few days, when they wilted and the leaves fell. The aphids died and no wings were produced. The experiment was repeated a little later, this time by changing the cuttings about every three days and transferring the aphids to the fresh cuttings. In this way three generations were raised and about thirty individuals in each. All were apterous. No winged forms were produced not even in the second and third generations.

Effect of Chemicals on Plants. In all cases where cut stems were placed in chemical solutions it was observed that the checks in distilled water would last longer. A number of tests with cuttings used in solutions of varying strength of the above chemicals showed this always to be the case. The chemical solutions caused wilting the second day and dropping of the leaves in two or three days. The checks stayed fresh for five days. In all these cases the results were conclusive enough to show that the chemical solutions do have a deleterious effect on the cut plants, and plant physiologists agree on this point. Where the solution is strong enough it will have an osmotic pressure, which will draw the sap from the cutting and consequently cause it to turn brown and wither. The fact that the checks always lasted longer, and therefore the aphids lived longer, is sufficient cause for the greater number of winged forms there. The experiment failed, however, to show that the chemicals in the stems will cause the aphids to produce wings, since the checks always produced as large a number of winged forms.

(To be continued)

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ON A COLLECTION OF THYSANOPTERA FROM RABUN COUNTY, GEORGIA

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A vacation of fifteen days spent in north-eastern Georgia during the latter part of August and the first days of September, 1922, gave the writer an opportunity to compare the thrips fauna of that region with that of Florida.

There are no records of any considerable collection of thrips from this region. The nearest localities that have been intensively studied are about Clarksville, Tenn., where Morgan has collected, and about Washington, D. C., where Hood has done much of his collecting.

Rabun County is in the north-eastern corner of Georgia. It is high and mountainous, the elevations ranging from about 2000 feet to 3900. As to the vegetation: here we found most of our boyhood friends (and enemies too—such as nettles and burdocks) of northern Ohio. But in the valleys one notes such southern plants as bitterweed *(Helenium tenuifolium)* and sweet gums and on the mountain sides the belated blossoms of the sourwood *(Oxydendron arboreum)* were conspicuous. On the whole the vegetation is much like that of southern Ohio or Kentucky.

The first observation to be made was the scarcity of thrips as compared with Florida. They are by no means such an important part of the fauna as with us. They do not force themselves upon one's attention. One must hunt for them, otherwise he would scarcely discover their existence.

The most productive collecting was, as usual, in flowers. Even such an unlikely blossom as the Indian pipe supplied us with one.

But the Florida flower thrips *(Frankliniella bispinosa)* was entirely absent, its place being partly taken by its close relative *F. tritici*. But this insect was by no means as common as ours. It did not swarm in the blossoms, even of roses. Three or four per blossom was the maximum. Still this was the most common species. Numerous dissections of the heads of *Compositae* failed to discover any *Thrips abdominalis*, so common in the heads of composites in Florida.

Next after flowers these insects were most abundantly obtained by sweeping grass and weeds. Our most common species on grass, *Haplothrips graminis*, was entirely lacking. A new species of Haplothrips was obtained from grass but the most common species was *Frankliniella fusca*. This was much more common than in Florida, where it is known chiefly as a pest of tobacco, and nearly as common as its relative *F. tritici*.

Beating and sweeping shrubs brought in very few specimens. The most common was *Leptothrips mali*, the black hunter, a predaceous species that was quite apt to be found on any plant infested with plant lice. In vain were the young pines beaten for our pine thrips *Haplothrips pini*.

In all twenty-three species were taken, four of which proved to be new. *Thrips quinciensis, Haplothrips gracilis*, and *Hoplandrothrips flavoantennis* have hitherto been taken only in Florida. *Thrips impar* was described from Maryland and has not hitherto been reported elsewhere. *Frankliniella tenuicornis* has not heretofore been reported from America. Thus four species have had their known range considerably extended.

It is thus seen that the Thysanoptera, like the plants, show a mixture of southern and northern species.

A list of the species and their host plants follows:

THYSANOPTERA OF RABUN COUNTY, GEORGIA

Species	*Number taken*	*Host Plants*
Aeolothrips bicolor *Hinds*	3	Grass.
Sericothrips variabilis (Beach)	1	Shrubs.
Chirothrips insolitus *Hood*	1	Grass.
Malacothrips (?)	1	Weeds.
Heliothrips fasciapennis *Hinds*	9	Grass (8), smartweed *(Polygonum)*.
Heliothrips haemorrhoidalis (Bouche)	1	Shrub.
Thrips quinciensis *Morgan*	2	in blossoms of *Vernonia* and *Polygala*.

Thrips crenatus n. sp.	3	Pine, *Lespedeza*, bitterweed.
Thrips impar *Hood*	6	Indian pipe, *Lespedeza* (4), grass.
Frankliniella fusca *(Hinds)*	35	Grass (29), pine (2), *Lespedeza* (4).
Frankliniella minuta *(Moulton)* (?)	1	Red Clover.
Frankliniella tenuicornis, *Uzel*	2	On grass (identified by R. C. Treherne).
Frankliniella tritici *(Fitch)*	36	A variety of blossoms.
Heterothrips auranticornis n. sp.	16	Blossoms of *Helenium*.
Haplothrips rabuni n. sp.	5	Grass.
Haplothrips statices *Holiday*	4	Grass.
Haplothrips verbasci *(Osb.)*	14	Mullein.
Haplothrips angustipennis n. sp.	2	Grass.
Haplothrips gracilis *Watson*	1	
Leptothrips mali *(Fitch)*	16	On many shrubs and herbs.
Hoplandrothrips flavoantennes *(Wats.)*	1	Oak.
Hoplandrothrips pergandei *(Hinds)*	1	Grass.
Idolothrips armatus *Hood*	1	On wild cane *(Arundinaria)*.

Thrips crenatus, n. sp.

Female. Length about 0.8 mm. (0.74 to 1 mm.). Color dark brown, thorax lighter with a little orange hypodermal pigment. Without prominent bristles except near the end of the abdomen.

Measurements: Head, length .075, width .105; Prothorax, length .113, width .15; Mesothorax, width .207; Abdomen, width .214; Antennae, total length .173 mm.

Antennal segment	1	2	3	4	5	6	7
Length	18	27	32	28	22	37	16 microns
Greatest width	19	21	18	18	15	16	7 microns

Head about a third wider than long and two thirds as long as prothorax into which it is deeply retracted. Cheeks very slightly arched. Plainly sculptured with transverse anastomozing lines, a row of minute bristles behind each eye. *Eyes* dark, large, occupying about two-thirds the length and .7 the width of the head; non pilose; facets large. *Ocelli* large, light brown; widely separated, posterior situated opposite the posterior two-thirds of the eyes; bordered by deep orange crescents. *Antennae* rather short, from twice to two and a third times as long as the head. Segments 1 and 2 but little lighter than the head; 3-5 varying from yellowish brown (lighter at the base) to dark brown concolorous with the others; 6 and 7 dark brown. 1 cylindrical, about as wide as long; 2 urn-shaped with a very broad base, conspicuously wider than any of the others; 3 urn-shaped, abruptly narrowed to a slender pedicel; 4 oval, 5 smaller, urn-shaped; 6 cylindrical; 7 conical. Sense cones and bristle all short, colorless, almost invisible; a sense cone on the outer apical angle of segment 3 thick and heavy.

Prothorax large, sides convex and diverging posteriorly, without sculpture, a short, colorless bristle on each posterior angle.

Mesothorax sculptured in the middle of the dorsal surface, sides bulging. Metathorax with nearly straight but diverging sides. *Legs* almost uniformly brown, but little lighter apically. *Wings* uniformly brown except for a small colorless area about .2 the length from the base. Costal fringe of hairs scanty, absent from basal half. Veins rather prominent; costal bearing from 23 to 26 bristles, the others from 5 to 7, scale 5.

Abdomen with a few short, brown bristles on segments 9 and 10. Dorsal surface faintly sculptured. The posterior margin of each segment is bordered with a series of about 20 rounded lobes. On the posterior segments these are more difficult to detect.

Male not seen.

Described from three females taken in Rabun Co., Ga., on *Lespedeza,* pine and bitterweed *(Helenium)*. Readily recognized by the dark color, short intermediate antennal segments and crenated posterior borders of abdominal segments.

Type in the author's collection. Paratype in the National Museum.

Heterothrips auranticornis, n. sp.

Female. Color of the body a uniform deep brown, tip of fore femora, and both ends of others, and of all tibiae, and most of the tarsi, brownish yellow. Antennal segments 3 and 4 yellow, conspicuously shaded with orange.

Measurements: Total length, females 1.2, male .8; head length, females .112, males .107; width, females .15, males .133; Prothorax, length, females .13, males .128, width, females .22, males .18; Mesothorax, width, females .23, males .20; Abdomen, width, females .30, males .14; total, females .25, males .22.

Antennal segments	1	2	3	4	5	6	7	8	9
Length	20	30	55	39	28	32	24	20	19 microns
Width	19	26	53	35	27	28	19	18	15 microns

Head about a third wider than long, widest behind the eyes. Cheeks arched, roughened, and bearing a few short, stiff bristles. All the dorsal surface behind the eyes striated with a half dozen anastomozing lines. Frontal costa deeply emarginate. A row of four minute bristles behind each eye and posterior ocellus. One in front of each posterior ocellus and a minute one near the inner anterior angle of each eye, opposite the anterior ocellus. *Eyes* dark, very large, occupying about .7 the length and .8 the width of the head, non-protruding, pilose, facets very large. Posterior ocelli very large, situated opposite posterior third of the eyes and touching their margins. Anterior about half the diameter of the posterior and about the size of the facets of the eyes; situated on the edge of the frontal emargination and directed forward. *Mouth cone* reaching about half way across the prosternum; sides almost straight up to the prolonged but rounded apex. Antennae 9-segmented, 2.2 as long as the head. Segment 1 short and thick, concolorous with the head; 2 lighter; 3 and 4 yellow with considerable orange pigment; 5 at least two-thirds yellow but dark brown at the extreme base and apex; 6 brown but yellowish on basal half; 7-9 dark brown. 3 long wedge-shaped with a narrow base; 4 and 6-9 barrel-shaped; 5 oval; 4-6 with short broad pedicels; margins, especially of 3 and 4, conspicuously crenate. Hairs and sense cones very pale, short and inconspicuous. A distal ring of sensoria on segments 3 and 4.

Prothorax but little longer than the head and 1.7 as wide as long; widest posteriorly. Anterior margin and sides nearly straight; posterior margin much arched. Dorsal surface striated posteriorly. A short, thick spine on each anterior angle and two on each posterior; a row of eight minute ones along the anterior margin and about a score of others scattered over the dorsum. *Legs* rather slender. Fore femora but little thickened. Membranes of fore wings dark brown except two minute areas near the base; .075 mm. wide at the base (exclusive of scale); rather abruptly narrowed at about a third of their length to half the sub-basal width; length ten times that of the sub-basal width. Costal vein with about 31, anterior with 24 and posterior vein with 20 bristles.

Abdomen not pubescent but provided with a number of short bristles, a row along the posterior margin of each segment being especially prominent.

Males similar to the females but smaller. Fore femora considerably enlarged.

Described from fourteen females and two males taken from the heads of a composite *(Helenium)* in Rabun County, Ga. Type in the author's collection. Paratypes in the National Museum and in that of the University of Florida.

Haplothrips rabuni, n. sp.

Female. Length about 1.5 mm. Color dark brown to black with some reddish hypodermal pigment; antennal segment 3 and usually (but not always) fore tarsi and apical inner portion of fore tibiae yellowish brown.

Measurements: Head, length .20, width .166; Prothorax, length .122, width .241; Pterothorax, width .277; Abdomen, width .273; Tube length .108; width at base .054, at apex .031 mm. Antennae, total length .27 mm.

Segment	1	2	3	4	5	6	7	8
Length	21	40	41	46	42	40	37	26 microns
Width	27	26	22	29	27	27	26	14 microns

Head longer than wide, broadest at the middle, cheeks gently arched, slightly convergent posteriorly; vertex rounded, slightly produced. Postocular bristles fairly long but, like all the other bristles of head and thorax, almost or quite colorless and difficult to detect. *Eyes* medium sized, occupying slightly more than a third of the length of the head, not protruding, not pilose. Ocelli large, yellowish, the anterior on the extreme vertex of the head and directed forward, the posterior pair opposite the anterior third of the eyes. *Antennae* about a third longer than the head. Segment 1 (and sometimes 2) concolorous with the head; 3 yellowish brown; 4 and 5 light brown without yellowish bases; 6-8 darker brown; 1 short-cylindrical; 2 urn-shaped; 3-6 oblong elliptical, 3 quite markedly pedicellate, 4-6 with broader, shorter pedicels; 7 barrel-shaped, truncate at the apex and broadly united with 8; 8 sub-conical. Sense cones and bristles short, colorless and inconspicuous. *Mouth cone* blunt, reaching past the middle of the prosternum.

Prothorax small, about .6 the length of the head and, including coxae, twice as wide as long. Coxa bears a short but thick and brown bristle, the only conspicuous one on the anterior portion of the body, others colorless, mostly blunt at apex; a pair on each posterior angle of medium length.

Pterothorax considerably wider than prothorax. Sides slightly converging posteriorly. *Wings* rather short, membrane reaching but little past the middle of the abdomen; colorless except for a decidedly brown area at the base of the primaries; primaries markedly narrowed in the middle, fringe rather sparse, of medium length, with 6 or 7 interlocated hairs. *Legs* rather slender, except fore tarsi and tibiae, concolorous with the body; fore femora but slightly enlarged; fore tarsus with a small, short, acute tooth.

Abdomen rather long and slender, bristles rather short, light brown to colorless and pointed. Tube rather short, terminal bristles but little longer than the tube.

Male not seen.

Described from four females taken from grass and sedges along a small stream at Clayton, Rabun County, Ga. Type in the author's collection. Paratypes in the National Museum and in that of the University of Florida.

Close to H. graminis Hood, but differs in the shorter and darker antennae, darker color, smaller prothorax, larger pterothorax, longer, more slender abdomen, longer intermediate antennal segments and colorless bristles.

Haplothrips angustipennis, n. sp.

Female. Body length about 1.3 mm. (from 1.14 to 1.46). Color almost uniformly dark mahogany brown, fore tibiae and tarsi and intermediate antennal segments yellowish brown.

Measurements: Head, length .185, width .151; Prothorax, length .12, width .25; Mesothorax, width .25; Abdomen, width .227; Tube, length .106; width at base .061, at apex .031. Antennae, total length .29 mm.

Segment	1	2	3	4	5	6	7	8
Length	26	37	45	50.5	44	40	38.5	26 microns
Width	26	24	20	25	23	23	21	16 microns

Head about a third longer than broad. Cheeks slightly arched, converging slightly posteriorly, somewhat roughened and bearing a few short bristles. Postocular bristles conspicuous, pointed, nearly as long as eyes. Eyes large, occupying nearly half the length of the head, not pilose, facets large. *Ocelli* large, larger than facets of the eyes, brownish yellow, posterior pair situated opposite the anterior .4 of eyes and contiguous with their margins; anterior directed forward. *Mouth cone* reaching about half way across the prothorax, abruptly constricted near the base but very broadly rounded at the apex. *Antennae* 8-segmented. Segment 1 cylindrical, concolorous with the head; 2 urn-shaped, abruptly constricted to a very broad pedicel, concolorous with the head except the yellowish brown apex; 3 obovate, narrower than either 2 or 4, gradually narrowed to a broad base, yellowish brown, darker along the sides and with a broad, colorless band at the apex, usual sense cones present but colorless and inconspicuous; 4 ovate with a short, broad pedicel, basal third concolorous with 3, but remainder darker, the colorless collar at the apex narrow; 5 and 6 barrel-shaped, pedicel shorter and narrower than in 4, dark brown; 7 cylindrical, sides but slightly arched and converging slightly apically; 8 unusually large, margin conspicuously crenate. All antennal bristles thin, pale brown and inconspicuous.

Prothorax (including coxae) about twice as wide as long, trapezoidal in outline, much widened posteriorly, posterior margin arched, posterior angles abruptly rounded and bearing a pair of sharp-pointed, light colored bristles of medium length; coxae each bearing one short, dark, thick bristle and a pair of very short, thorn-like spines; anterior angle with a short heavy bristle.

Mesothorax broad, with very acute anterior angles and nearly straight sides which converge slightly posteriorly. *Mesothorax* somewhat narrower, sides more arched and more constricted posteriorly. *Wings* rather weak, membrane scarcely reaching the eighth abdominal segment, quite narrow except at the extreme base, unusually deeply constricted for a Haplothrips, to a diameter about half that nearer the apex. Fringing hairs moderately long, seven interlocated ones. *Legs* rather slender, dark, fore femora but little thickened; fore tarsus with a small tooth.

Abdomen long and slender, destitute of conspicuous bristles, those of the ninth segment shorter than the tube. Tube of moderate size, sides slightly concave, terminal bristles about as long as the tube.

Male not seen.

Described from two females taken from coarse marsh grasses at Clayton. Type and paratype in the author's collection.

Hoplandrothrips flavoantennis (Wats.)

The female only was originally described. *(Liothrips flavoantennis,* Ent. News, March 1916, p. 129.) A male was collected in Georgia.

Male. Color uniformly dark brown except antennal segments 3-8, which are bright yellow. (In some females also segment 8 is yellow, also segment 2 may be brown.)

Measurements: Total length 1.7 mm.; head, length .235 mm., width .18 mm.; prothorax, length .13 mm., width including coxae .29 mm.; meso-

(Continued on page 47)

The

FLORIDA ENTOMOLOGIST

Official Organ of The Florida Entomological Society, Gainesville, Florida.

J. R. WATSON .... *Editor*
WILMON NEWELL .... *Associate Editor*
A. H. BEYER .... *Business Manager*

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THE ENTOMOGENOUS FUNGI

October was an unusually rainy month in Florida. According to the Weather Bureau the average for the state was 8.28 inches above normal, and only one station in peninsular Florida (New Smyrna) reported a deficiency. There was not a single day without rain at some station. Due undoubtedly to this meterological condition the entomogenous fungi have been unusually efficient this fall thruout the citrus belt. A careful count of some hundreds of citrus leaves at Gainesville showed that the fungi had killed 97.2% of the fall brood of whitefly—a percentage of kill seldom equalled in commercial spraying. In the order of their efficiency the fungi ranked as follows: the brown fungus, the red aschersonia, *Microcera*, the cinnamon fungus.

RECENT PUBLICATIONS

Bulletin 165 of the Experiment Station and the October number of the Quarterly Bulletin of the State Plant Board are of unusual interest and importance to Florida and other cotton-growing states. In this bulletin Mr. Geo. D. Smith presents "A Preliminary Report Upon an Improved Method of Controlling the Boll Weevil". "The gist of the method may be summarized in two sentences, as follows:

1. Remove all squares from the cotton plants about June 5 and destroy them.

2. Follow this at once with a thoro application of calcium arsenate or lead arsenate, using a suitable dusting machine."

These measures reduce the weevils to such small numbers that the cotton is enabled to set a good crop of bolls before the weevils again become abundant. Where this method of control has been tried the past year practically as much cotton has been harvested as would have been gathered were no weevils present.

The principle underlying this method of control is that towards which the best practice in economic entomology is steadily tending, viz., a very thoro cleanup of the insect and hence less need of frequent repetition, as near an approach to eradication as is practicable rather than temporary palliatives. This method of dealing with the boll weevil parallels quite closely the latest recommendations for the control of the curculio in peaches and plums, i. e., to pick up and destroy the drops with their contained larvae as well as poisoning the adults.

Farmers' Bulletin 950, by Philip Luginbill, treats of the Southern Corn Rootworm (Diabrotica 12-punctata). Altho a common insect in Florida, this beetle is with us not a serious pest of corn. In the extreme northern part of the state it takes a small percentage of the young corn. The author recommends planting in late April to escape damage from this insect. This beetle is very common in oat fields about Gainesville from January to March.

Dr. H. S. Davis, until a year ago head of the department of zoology in the University, is the author of "A New Bacterial Disease of Fresh Water Fishes"—Document 924, U. S. Bureau of Fisheries.

Carl B. James, Horticulturist for the L. and N. Ry., has recently published a very attractive and valuable bulletin on the satsuma orange.

THE SCOLDING BUTTERFLY

Dear Friends of the Entomological Society:

When a person arrives in a new country, the first things that attract his attention are the objects and customs to which he is not accustomed in his own country. So it was with me when I arrived in Brazil. I saw hundreds of interesting and important things that the average Brazilian, who has lived among them always, "never saw". Brazil, as you know, is noted for its magnificent butterflies and gigantic insects of various orders. Some of the unusual insects are credited with being extremely venomous. I was told of one insect so venomous that if it lights on the trunk of a tree, the tree dies from the effects. Entomologists, being extremely innocent, capture these insects with impunity. The thing I want to tell you about today is the Scolding Butterfly, *Ageronia feronia*, L.

My friends in Florida will naturally think that I have gone "louco" with the heat. But remember that in Brazil we are now in mid winter, and some mornings the weather is dreadfully cold (?). At least my Brazilian friends say that it is. And the Centigrade thermometer says that the temperature is some seven or eight degrees above zero. Now what I was going to tell you about is the butterfly that has a voice. I am sending you a photograph that represents her sitting on a palm tree. I know that it is a female which does the talking because the voice is high keyed and staccato. A male never could get up so much energy.

The scolding is done probably with organs similar to those used by crickets or katydids. The sound is not quite as strong as that of the big katydids nor of the big black cricket. Organs similar to those possessed by these insects are located near the base of the wings. They make this snapping noise only when on the wing. Sometimes they scold their mate and sometimes they scold the entomologist who is passing by.

Another peculiarity of this species is that it looks very much like the lichens that inhabit tree trunks. The photograph I enclose you brings out this peculiarity very strikingly.

Now if there is any entomologist present who doubts the correctness of these observations, let him look up Holland and also Sharp, who likewise became affected with the Brazilian heat.

Very truly yours,

(Signed) P. H. ROLFS.

Vicosa, E. F. Leopoldina,
Minas Geraes, Brazil.
July 27, 1922.

HYMENORUS OBSCURUS AS A PEST OF CITRUS (COL. CISTELIDAE)

J. R. WATSON

Occasionally one sees on the bark of citrus and other trees a dense colony composed of hundreds of little black beetles. The beetles are oval in shape, less than a quarter of an inch long and covered with grayish-brown hairs. In the late afternoon the beetles leave their resting place and go in search of food which consists mostly of lichens and other growths on the bark of the trees. But it seems that they may occasionally become pests. In July Mr. S. B. Jones of Orchid, Fla., sent in to the Experiment Station a number of these beetles with the statement that they had been feeding extensively on "June bloom" and other tender growth of his trees. In confinement they feed greedily on tender citrus foliage.

The writer has also recently caught these beetles eating out freshly inserted buds in a nursery. It would seem that this beetle must be included among the minor pests of a citrus tree.

This beetle should not be confused with the downy darkling beetle *(Epitragus tomentosus)*, which it considerably resembles in shape and color. The latter is larger, never collects in colonies, and is one of the most beneficial insects in a citrus grove. Its food habits are very similar to those of lady beetles and in many groves it is much more abundant than even the twice-stabbed lady-beetle.

A NEW CITRUS INSECT

A caterpillar recently found feeding on the leaves of a young grapefruit tree at Orlando, Florida, proved on rearing to maturity to be *Prodenia latifascia* Walker.

Altho this insect probably is of no economic importance as a pest, its presence seems to be a new record for citrus insects. Hence this note may be of interest.

The identification was made by Mr. Wm. Schaus of the National Museum, who says that *P. latifascia* Walker is essentially a tropical insect found from Mexico to Argentina, including Jamaica, Cuba, Haiti, St. Lucia. The only previous records of its breeding in the United States is one each from onions and alfalfa in Texas. Nothing is known of its host plants in other countries.

The insect belongs to the cut worm family and resembles somewhat, both in larval and adult form, some of our common pests, as the sweet potato caterpillar, *P. commelinae*, and the cotton boll cut worm, *P. ornithogalli.* When full grown the larva was about 2 inches long and of a brownish gray velvety color with a wide dark band down the dorsal surface and 3 narrow golden brown stripes along each side; ventral surface greenish brown.

It pupated July 31st in soil and the moth emerged August 17, 1922.

ARTHUR C. MASON.

THE PSOCID OF THE OAKS

FRANK STIRLING

Thruout the south-eastern United States, especially in Florida, the water oaks frequently take on a bright silvery-grey coloring which shows particularly on the larger limbs and trunks. Close observation shows this to be caused by a silky web which completely covers the surface. This web is of a bright, clear color and glistens in the sun and on bright moonlight nights, making an effect well worth noticing.

By removing a part of the web with a pen knife or sharp stick one may, by carefully observing, note countless numbers of a tiny insect. This little insect is known as a psocid (Psocus sp.) and is related to the book-lice. These psocids are useful rather than injurious, as they feed on fungus growths and lichens which grow on the trunks and larger limbs of the oaks. They apparently spin this fine, gauzy web for their protection against birds and other enemies which would otherwise destroy them.

This insect is reported as occurring in especial abundance on water oaks in the vicinity of Lakeland, Orlando, Sorrento, Dade City and Gainesville, Fla., along the Gulf Coast in the vicinity of New Orleans, La., and near Mobile, Ala. To those not informed the appearance of this grey, silvery covering is often viewed with alarm.

The webs, together with the insects, will disappear after a short time and the only effect upon the tree will be a cleaner and healthier appearance of the bark.

A NEW THRIPS FROM CITRUS IN ALABAMA

J. R. WATSON

Haplothrips harnedi, n. sp.

Female. Dark brown, 3rd antennal segment and distal half of tibiae yellowish brown.

Measurements: Total length 1.36; head, length .18, width .13; prothorax, length .15, width .24; mesothorax, width .22; abdomen, width .27; tube, length .108, width at base .057, apex .033.

Antennal segment	1	2	3	4	5	6	7	8
Length	28	45	45	48	40	38	39	27 microns
Width	30	28	25	26	23.5	21	17.5	11 microns

Head a third longer than wide; dorsal surface with a few faint cross striations; cheeks slightly convex, converging a little posteriorly. Post-ocular bristles nearly as long as the eyes, with dilated, colorless tips. *Eyes* medium sized, not protruding, not pilose, black, triangular in outline. *Ocelli* medium sized, widely separated, anterior situated far forward, posterior pair opposite the anterior .4 of eyes and near their margins, bordered by dark crescents. *Mouth cone* broadly rounded, reaching scarcely to the middle of the prothorax. *Antennae* 1.6 times as long as head; segments 1, 6, 7, and 8, concolorous with the head, 2 and 5 a little lighter, 4 considerably lighter, 3 brownish yellow to yellowish brown with colorless apex; sense cones colorless and inconspicuous, spines small, light brown.

Length of prothorax a little greater than width of head, width (including coxae) 1.6 times the length. Prominent spines near the anterior angles, on coxae, and near the posterior angles; all with dilated tips.

Pterothorax distinctly narrower than the prothorax, sides straight, converging posteriorly. *Legs* rather short, femora lighter than the body; fore pair slightly enlarged. *Wings* rather weak but membrane reaching the fifth segment. Fringing hairs sparse, about three interlocated ones on primaries.

Abdomen variable in shape. In some individuals excessively long and slender, in others but little more than twice as long as wide. Bristles few; some of those on the last segment have dilated tips but the longest have acute tips. *Tube* rather small, sides rather abruptly dilated at the base; terminal bristles short.

Male not seen.

Described from nine females collected on citrus trees in southern Mississippi and sent to the author by Prof. R. W. Harned. Type in the author's collection. Paratype in the National Museum.

Close to *H. funki* Watson, but differing in the darker color of the tibiae, tarsi, and third antennal segment, smaller size, relative lengths of antennal segments and especially the narrow pterothorax.

PERSONALS

Dr. Carl J. Drake is now state entomologist of Iowa.

Dr. Wilmon Newell has been called north by the death of his father.

Mr. W. L. Goethe is teaching science in the Live Oak High School.

The potato growers of the Hastings district sent Dr. C. D. Sherbakoff to Maine to select seed for them.

Mr. C. M. Berry spent part of the summer in New York State inspecting sources of seed used by the Sanford growers.

Dr. W. S. Blatchley left Indianapolis on November 14 for Rio de Janeiro, Brazil. He expects to return to Dunedin the last of March.

Mr. A. H. Beyer, assistant entomologist of the Experiment Station, plans to spend several weeks at Harvard studying entomogenous fungi.

According to Science Mr. John Belling, former plant breeder in the Experiment Station and now of the Eugenics Laboratory at Cold Spring Harbor, N. Y., received the doctorate from the University of Maine in June.

Dr. H. S. Dozier, former assistant in the Experiment Station, is in charge of the camphor scale investigations of the U. S. Bureau of Entomology and is stationed in New Orleans. He received the doctorate from Ohio State in June.

REPORT OF MEETINGS OF THE FLORIDA ENTOMOLOGICAL SOCIETY

September 25. The Society met in Language Hall at 4:30 o'clock, President Stirling in the chair. Those present were: Beyer, Chaffin, Goodwin, Merrill, Montgomery, Rogers and Watson. New members elected were: Miss Georgia Berger, teacher of Biology in Tampa High School; Miss Bernice Dew and Rudolph Baldwin, teacher and student in Alachua High School; and Mr. S. E. Neal, of the firm of Neal & Neal of Jacksonville.

The question of continuing the joint meetings with the Horticultural Seminar was discussed and referred to the Executive Committee.

Under "Brief and Timely Notes" Prof. Watson spoke of observations on the Mexican Bean Beetle in Rabun County, Georgia, and the capture of the greenhouse thrips out of doors. Mr. Goodwin reported the discovery of European Foul brood in Seminole County.

The address of the evening was given by Dr. J. S. Rogers, on the Museum of Zoology of the University of Michigan. This is a research museum rather than an exhibition museum. Dr. Rogers spoke of the progress made in surveys of the different groups, particularly insects. The talk was very interesting and showed that Dr. Rogers is doing a great part in the carrying out of their plans by working up the family Tipulidae (crane flies) of the order Diptera.

November 1. The Society met in joint meeting with the Horticultural Seminar, Major Floyd in the chair.

Members present: Montgomery, O'Byrne, Chaffin, Beyer, Lord, Watson, Berger, Stirling, Merrill, and Stone. Mr. E. R. Mezgler of Hightown, N. J., was elected to membership.

The paper of the evening was by Professor Floyd on "A Proposed Score Card for Judging Citrus Lands". It was freely discussed by members present.

A. H. BEYER, Secretary.

ON A COLLECTION OF THYSANOPTERA FROM RABUN COUNTY, GEORGIA

(Continued from page 39)

thorax, width .29 mm.; abdomen, greatest width .29 mm.; tube, length .16 mm., width at base .064 mm., at apex .034 mm. Antennae, total length .44 mm.; segment 1, 27; 2, 50; 3, 77; 4, 77; 5, 69; 6, 67; 7, 55; 8, 29 microns.

Head about 1.5 times longer than wide. *Eyes* large, occupying nearly a third the length of the head and fully a third of the width, slightly protruding, non-pilose, red by reflected light. Ocelli large, yellowish, situated far forward. The anterior on the large frontal lobe between the bases of the antennae and directed forward. The anterior margins of the posterior pair about opposite the anterior margins of the eyes. *Mouth cone* long, tapering, almost reaching the mesosternum. *Antennae* long and slender, nearly twice as long as the head. Segment 1 and base of 2 concolorous with the head, apex of 2 lighter brown; remaining segments clear bright yellow. Abdomen long and slender, tapering gradually to the 8th segment and then more abruptly; bristles on the posterior angles of the segments progressively longer, those on the 9th nearly as long as the tube. Tube long and slender. Otherwise identical with the female.

Described from a single male taken from oak at Clayton.

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THE CRAMBINAE OF FLORIDA*

GEO. G. AINSLIE
U. S. Bureau of Entomology, Knoxville, Tennessee

The following is a list of the moths of the subfamily Crambinae so far as they are known to occur in Florida. The records come both from published accounts and from data collected from museum specimens. I have gone carefully over the material in the National Museum at Washington, and early in March 1922 I had the privilege of spending several days examining the material in the magnificent collection of Dr. Wm. Barnes at Decatur, Ill. It is with his permission that the localities represented there for the various species are included in the present list. I am greatly indebted to him for his kindness and generosity and I take pleasure in acknowledging herewith my gratitude to him for the numerous courtesies he showed me. Several other smaller collections have been visited in which an occasional Florida specimen was found. The available literature has been thoroughly canvassed and, so far as possible, the first author reporting the occurrence of a species in the state has been given credit therefor.

This list contains 36 species and varieties whose occurrence in the state is well authenticated. Three others are listed which, for one reason or another, have no right to the places they have been previously given and hereafter should be dropped. The list for Florida is probably more nearly complete than those for most of the other states, due to the fact that Florida is a favorite collecting ground, especially in winter, and at various times has been visited by many lepidopterists and collectors. So far as I know, however, no one interested especially in the smaller moths has collected consistently throughout the year and it is likely

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that other species will be found whose season of adult activity occurs in the summer or fall.

It is with the hope of stimulating interest in this group that this list is published and also that by the combination of many such small bits a complete list of the Florida insects may some day be possible.

Argyria argentana Martyn.

First reported "aus Georgien in Florida" by Hubner in 1818 as the type locality of *nummulalis* which, by all modern authorities is now accepted as a synonym of *argentana* Martyn. Listed from Florida also by Fernald (1896) and Dyar (1902). In the National Museum there are specimens from Cocoanut Grove (Schwarz), Miami (Schaus) and Ft. Drum. In the Barnes collection there are also specimens from Hastings (Kearfott), Ft. Myers, St. Petersburg (Ludwig), and Crescent City. I have taken it at Orlando and Lakeland.

Argyria auratella Clemens.

Fernald (1896) first reported this species from Florida. The National Museum contains specimens from Tallahassee, and Lakeland (Ainslie). Dr. Barnes has specimens from Everglade and Hastings (Kearfott). This species is widely distributed, having been reported from Nova Scotia and Manitoba to California and Florida.

Argyria consortalis Dyar.

A species described by Dyar (1909) and known only from its type locality, Dade City, Fla.

Argyria critica Forbes.

Described by Forbes (1920) from North Carolina with paratypes in the Barnes collection from Everglade and Hastings. This species had previously been confused with *auratella* and doubtless in many collections still stands under that name.

Argyria lacteella Fab.

The smallest native species of this genus. First recorded from Florida by Fernald (1896). Specimens in the National Museum from Archer, Miami (Schaus), Lakeland (Ainslie) and in Barnes' collection from Fort Myers. Although occurring as far north as Pennsylvania and Maryland, this species covers also the West Indies and Central and South America. I have found it very abundant at times near Lakeland and have taken it also at Orlando and Gainesville. It is very variable in markings which accounts for the half dozen or more names in its synonomy.

Argyria nivalis Drury.

First recorded from the state by Fernald (1896). Dyar (1901) notes one specimen taken at light at Lake Worth. The National Museum contains a specimen from Cocoanut Grove (Schwarz) and Barnes has a specimen from Fort Myers. I have taken it at Lakeland, Orlando and Port Tampa.

Chilo plejadellus Zincken.

The rice stalk-borer. Has never been reported from Florida but in Dr. Barnes' collection there is a single specimen from Hastings.

Crambus caliginosellus Clemens.

This species is included in the Florida list because of a single specimen in Dr. Barnes' collection labeled "Hastings, Fla., Coll. of W. W. Kearfott."

Crambus decorellus Zincken.

There are three specimens in the National Museum taken at Archer in March 1882 and four in Dr. Barnes' collection taken at Fort Myers in April and May. No previous published record from the state.

Crambus elegans.

Two specimens in the National Museum from Miami (Schwarz) and Archer.

Crambus haytiellus Zincken.

Not previously recorded from Florida. The National Museum has specimens from Cocoanut Grove (Schwarz) and Key West and Dr. Barnes, others from Everglades, Fort Myers and Chokoloskee.

Crambus multilinellus Fernald.

Originally described from Florida by Fernald (1887). Specimens are in the National Museum from Hastings and in Barnes' collection from Fort Myers.

Crambus mutabilis Clemens.

First recorded from the state by Grote (1880) under the name *fuscicostellus* Zeller. There are specimens in the National Museum, from Palm Beach (Dyar) and Archer and in Dr. Barnes' collection from Fort Myers and Lakeland. I have taken specimens at Fellsmere, Lakeland, Port Tampa and Orlando. At the latter place it was abundant at light during February and March.

Crambus praefectellus Zincken.

Although widely distributed over the state, this species has not previously been reported from Florida. There are specimens in the National Museum from Jacksonville (Ashmead). I have collected it at Gainesville, Fellsmere, Lakeland and Orlando. At Lakeland larvae were found attacking young corn.

Crambus quinqueareatus Zeller.

This species has heretofore been listed as *hastiferellus* Walker and has been reported from Florida under that name by Felt (1894). A comparison with the type of *quinqueareatus* Zeller in the British Museum made by Dr. McDunnough, shows the common Florida form to be this species. If Felt (1894) is correct in the determination of the species he calls *extorralis* Hulst, it becomes a synonym of *quinqueareatus* for the genitalia are identical. *Hastiferellus* is a northern form originally described from Nova Scotia and apparently never authentically reported from the South. *Quinqueareatus* was described from Texas and has been taken at numerous points in Florida. Felt (1894) is the first to record it from Florida under the name *extorralis* and *hastiferellus.* There are specimens in the National Museum from Palm Beach (Dyar) and Miami (Schaus), in the Carnegie Museum at Pittsburgh from Daytona (Laurent), and in Dr. Barnes' collection from Fort Myers, Chokoloskee, Hastings, Lakeland, LaBelle and

Dade City. I have also taken it at Lakeland, Plymouth and Fellsmere and repeatedly at Orlando, both at light and in the field. It is one of the most abundant species at light at Orlando during February and March.

Crambus satrapellus Zincken.

First recorded from the state by Grote (1880). There is one specimen in the National Museum from Dade City, in the Carnegie Museum at Pittsburg one from Melbourne (Laurent) and in Barnes' collection specimens from Fort Myers, Marco, Dade City, Hastings, and Kissimmee. I have collected it at Orlando, Lakeland, Plymouth and Fellsmere.

Crambus tripsacus Dyar.

Described from specimens from Miami (Dyar) and in Barnes' collection there are also specimens from St. Petersburg.

? **Crambus trisectus** Walker.

There are three specimens in the National Museum collection bearing the simple label "Fla." It is very doubtful, however, if these are correctly labeled for otherwise east of the Mississippi River the species is not known to extend farther south than the northern edge of Tennessee. It should not be listed as a Florida species without corroboration.

Crambus zeelus Fernald.

Not previously recorded from Florida. One specimen in the National Museum from Lakeland (Ainslie) and several in Barnes' collection from Hastings. I have also taken specimens referable here at Lakeland, Port Tampa and Orlando.

Diatraea differentialis Fernald.

This huge species, spreading 1½ to 2¼ inches, was originally described from Florida by Fernald (1888) and all the specimens which I have seen in collections have been from this state. There are specimens in Barnes' collection from St. Petersburg (Ludwig), Fort Myers, Kissimmee, Venice, Chokoloskee and Palm Beach, and one in the National Museum from Fort Myers (Davis).

Diatraea saccharalis crambidoides Grote.

This is the destructive sugar-cane moth-borer which also attacks Japanese cane and, much more rarely, corn. According to Holloway (1919) it occurs practically throughout peninsular Florida as far north as Gainesville.

Diatraea saccharalis saccharalis Fab.

The typical and more southern form occurring in the West Indies and South America. Dyar (1911) records a single specimen from southern Florida.

Diatraea zeacolella Dyar.

Because of the long-standing confusion between this, the larger cornstalk-borer, and *D. saccharalis crambidoides,* the sugar-cane moth-borer of our southern states, it is difficult to determine just who first reported this species from Florida. Holloway and Loftin (1919) state that it occurs in northern Florida.

Dicymolomia julianalis Walker.

The larvae feed in heads of cattail, *Typha latifolia.* A single specimen in Dr. Barnes' collection from Everglade. Not heretofore recorded from the state.

Dicymolomia pegasalis Walker.

Recorded from the southern states but never definitely from Florida. There are specimens in Dr. Barnes' collection from Lakeland, Chokoloskee and Glenwood.

Eoreuma densellus Zeller.

This species was originally described from Texas while *multilineatella* Hulst was described from Florida. The latter species was reduced to a synonym of the former by Smith (1891) and his verdict was generally accepted until Dyar (1909) showed it to be an error and resurrected *multilineatella* Hulst as a valid species. For these reasons the literature of *densellus* is confused and it is impossible to say to which of the two species reference is made. In the National Museum there are specimens from Palm Beach (Dyar), Cocoanut Grove (Schwarz) and Everglade, and in Barnes' collection from Hastings, Chokoloskee and Everglade.

Eugrotea dentella Fernald.

Originally described from Florida by Fernald (1896) and apparently not taken since.

Eugrotea incertella Zincken.

Not heretofore recorded from the state. A single specimen in Dr. Barnes' collection from Fort Myers.

Iesta lisetta Dyar.

Originally described from Dade City specimens by Dyar (1909). There is other material in the National Museum from Lakeland (Ainslie) and LaBelle. In Dr. Barnes' collection Glenwood and Fort Myers are represented in addition to those given above.

Platytes acerata Dyar.

A species described by Dyar (1917) from specimens from Dade City.

Platytes multilineatella Hulst.

Originally described from Florida by Hulst (1887). Long considered a synonym of *densellus* but resurrected and differentiated by Dyar (1909). There are specimens in the National Museum from Palm Beach (Dyar) and Dade City, and in Barnes' collection from Glenwood (Barnes), Hastings (Kearfott) and Chokoloskee. It has been taken at Orlando and Fellsmere by the writer.

Platytes punctilineella B. & McD.

Described by Barnes & McDunnough (1913) from Everglade. There are other specimens in Barnes' collection from Fort Myers and Marco.

Platytes squamulellus Zeller.

Not heretofore reported from the state. Three specimens in Barnes' collection from Everglade, one of which bears a label to the effect that it has been compared with the presumable type of *squamulellus* in the British Museum.

? **Prionapteryx nebulifera** Stephens.

Hampson (1895) records this species from Florida without giving his authority. It may be an error as no other authors before or since so listed it.

Prionapteryx serpentella Kearfott.

Originally described by Kearfott (1908) from specimens from Cocoanut Grove (Schwarz). There is also another specimen in the National Museum labeled "Egmont", a place I have been unable to locate.

Raphiptera minimella Robinson.

Not heretofore recorded from the state. It has been taken at Orlando and Lakeland by the writer. There is a specimen in Dr. Barnes' collection from Hastings and two in the collection of the Carnegie Museum at Pittsburgh from Melbourne.

Thaumatopsis actuellus B. & McD.

Described from Florida material from Lakeland and St. Petersburg by Barnes & McDunnough (1918). Also a paratype in their collection from "Stemper, Fla.", another place I cannot locate.

? **Thaumatopsis fernaldellus** Kearfott.

In listing his paratypes of this species, Kearfott mentions one from Key West. Later, however, Barnes & McDunnough described *T. floridellus* and placed this Key West specimen under that name so that there is no record to show that *fernaldellus* occurs in the state and it should not be so listed.

Thaumatopsis floridellus B. & McD. (1913).

The type material for this species came from Everglade and Marco. There is also in Barnes' collection the Key West specimen mentioned above.

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PERSONALS

Among the new assistant nursery inspectors are: C. C. Bennett, stationed with Fogg at Eustis; J. L. Lazenby, at New Smyrna; and O. D. Link at Clearwater.

The stork has passed out several favors to our members since our last issue, as witness U. C. Loftin, Jr., and Edward Murril Brown. Mr. James T. Marsh is also the proud father of a boy.

Mr. C. M. Hunt reports bag worms as damaging 25% of the fruit in a grove in Polk County. This is much the highest percent of damage from this insect of which we have ever heard.

Mr. F. F. Bibby is now located at Tlahnalilo, Durango, Mexico. He is employed by the Federal Horticultural Board on pink bollworm work.

The State Plant Board has found a spider mite on Bauhenia not only new to Florida but one hitherto reported only from Hawaii. It is Eupalopsis pavoniformis.

Mr. Jeff Chaffin has for the past month been acting as Assistant to the Associate Entomologist of the State Plant Board. Mr. Hunt has taken his place in the Nursery Inspection Department.

Introducing the two new members elected at the February meeting of the Society: Mr. Walker is a vocational student in the University who is much interested in Entomology. He is acting as part time assisttant in the Entomological Department of the State Plant Board. Mr. Trigg holds an industrial fellowship given thru the National Research Council. His work is the in-

(Continued on page 61)

The
FLORIDA ENTOMOLOGIST
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WILMON NEWELL .... *Associate Editor*
A. H. BEYER .... *Business Manager*

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THE BOSTON MEETINGS

The American Association for the Advancement of Science met in Boston during the holidays. Most of the meetings were held in the Massachusetts Institute of Technology, Cambridge. Dr. Charles D. Walcott, secretary of the Smithsonian Institution was elected president for the current year. The retiring president. E. H. Moore, of the University of Chicago, delivered an address on the subject "What is a Number?"

Dr. William M. Wheeler of Bussey Institute was elected president of the American Society of Naturalists and A. Franklin Shull, University of Michigan, secretary. Two joint programs were presented: "The Development of Biology (particularly Genetics) in the past Sixty Years", and a symposium on "Geographical Distribution of Animals". At the banquet Dr. Wheeler gave his presidential address on "Academic Biology".

The Entomological Society of America elected Arthur Gibson president and Professor C. L. Metcalf of the University of Illinois secretary. Wednesday's program was devoted to a symposium divided into two sections: Part 1 on "Noteworthy examples of Adaptation of Insects to Special Environments", and Part 2 dealing with adaptation in a single species of insect or with a single unit of adaptation. The annual public address of the Society was given Wednesday evening by Professor W. M. Wheeler. His subject was "The Physiognomy of Insects". This was a very instructive and interesting address. The subject selected for the symposium at the Cincinnati meeting in 1923 is "Methods of Protection and Defense Among Insects".

The 25th Annual Meeting of the Economic Entomologists, under the presidency of J. C. Saunders and with A. F. Burgess secretary, was held on Thursday, Friday, and Saturday, with a record for large attendance of members and visitors. Much of the program was devoted to experimental work on insecticides. Some of the large insect problems were presented and discussed. However nothing was said about the boll weevil. A feature of the meeting was an exhibit of the Gypsy Moth and the European Corn Borer displayed by the U. S. Bureau of Entomology.—A. H. Beyer.

DELPHASTUS AT BRADENTOWN

A recent trip to Bradentown afforded an opportunity to visit the citrus grove in which the California Delphastus was liberated in 1917 and where they have been most successful in controlling the whitefly. In only one small section of the grove was there enough whitefly to perceptibly blacken the trees and there the Delphastus was found. Were it not for the purple scale and rust mite this grove would not have needed spraying for the past five years. But in order to control the scale the grove has been sprayed about once a year. There were some signs of the Entomogenous fungi and undoubtedly the annual sprayings have also contributed to the control of the whitefly, and incidentally killed many of the beetles, but it would appear as if the Delphastus has been the major factor in the commercial control of the whitefly during the past five years. Indeed from the standpoint of their spread over the state they have been too successful. They have reduced their food to such a degree that they themselves are too scarce to make their collection practicable. The lady beetles have been pretty well distributed over the state but no systematic effort has been made to follow up these introductions and determine whether the beetles have established themselves. They are so small and quick to drop at the least jar that no one without experience with them would be likely to find them unless they were very abundant. In a grove at Crescent City they were much in evidence one summer but seemed to diminish in numbers during the winter. It is possible that they are better adapted to the southern part of the state.

A NEW MEALY BUG PREDATOR FOR FLORIDA

The Department of Entomology of the Experiment Station has received the first of several shipments of the lady beetle Scymnus binaeratus, which has done good work in controlling all species of mealy bugs in California. An effort will be made to rear these in numbers to be distributed over the state. They seem to bear shipment well, only about 20% of the beetles having died during the long journey without food from California. The Department is very desirous of securing mealy bugs to feed these lady beetles. Any of our readers finding any considerable number of mealy bugs will do a great service by sending a box of them by express collect to the Experiment Station.

—J. R. W.

AN ADDITION TO THE THYSANOPTERA OF FLORIDA—XI

J. R. WATSON

83. **Hoplandrothrips xanthopoides** Bagnall.

This insect was described in 1917 in the Journal of Biological Research from a single male collected in St. Vincent, British W. I. No reference to it has appeared since. The writer recently received from E. S. Sasscer, of the Federal Horticultural Board, three females and a male, and numerous larvae collected in the Plant Introduction Gardens in Miami. This find enables us to describe the female.

Female. Forma macroptera. Length about 2 mm. (from 1.7 to 2.2 mm.). Color similar to the male. In my specimens the base of antennal segment 6 is yellow as well as segments 3, 4, and 5 and abdominal segment 8 is yellow in the middle only. Head, thorax, and sides of the abdomen with much red hypodermal pigment.

Measurements: Head, length 0.25 mm., width 0.21 mm.; prothorax, length 0.18 mm., width, including coxa, 0.36 mm.; antennae, segment 1, 40; 2, 57; 3, 88; 4, 85; 5, 67; 6, 59; 7, 54; 8, 36 microns long. Mouth cone shorter than in the male, not reaching the mesosternum. Postocular bristles shorter than in the male, but little longer than the eyes. Fore femora considerably enlarged but not nearly as large as in the male, with a small tooth on the inner side near the end (not evident in all specimens.) Tooth of the fore tarsus well developed but much shorter than in the male. Wings somewhat constricted in the middle, 7 to 9 interlocated bristles.

Male. In my specimen the postocular bristles are even longer than described by Bagnall, about 1.5 as long as the eye, greatly enlarged and funnel-form at the tip, sharply curved outward. The fore tibia has the tooth characteristics of the genus. Fore tarsus with a long, powerful tooth. Only 9 interlocated hairs on the fore wings in the place of the 12 in Bagnall's specimen.

Larva. Light grayish brown but so liberally provided with red hypodermal pigment as to appear red.

Collected by Mr. W. B. Wood of the Federal Horticultural Board from *Moringa oleifera, Ziziphus mauritiana, Atalaya hemiglauca,* and *Randia tomentosa* Feb. 1923.

ARTICLES ON FLORIDA INSECTS

In the Canadian Entomologist for January, LV No. 1, Dr. W. S. Blatchley publishes "Notes on the Coleoptera of Southern Florida with Description of New Species".

In the Bulletin of the Brooklyn Entomological Society for February, Vol. XVIII No. 1, Mr. E. L. Bell has an article on "Collecting Florida Butterflies in March". He took 63 species in three weeks about Tampa.

In the Trans. Am. Ent. Soc., XLVIII, No. 831, the same author describes *Thorybes confusis*, a new skipper butterfly from Florida.

MEETINGS OF THE SOCIETY

Jan. 31, 1923. The Society met in Language Hall with Dr. Montgomery in the chair. Members present were Watson, Merrill, Floyd, Beyer, Montgomery, O'Byrne, Goodwin, Chaffin, Brown, and Lazonby.

The following officers were elected for 1923: President G. B. Merrill, Vice President Dr. J. S. Rogers, Secretary A. H. Beyer. The present staff of the Entomologist was reelected.

Faurtino Q. Otanes, a recent visitor to the University who is connected with the Bureau of Agriculture of the Philippine Islands, was elected a member of the society.

The president appointed Dr. Berger, Prof. Watson and A. H. Beyer a committee to draft a resolution of the Society urging the City Board of Health of Gainesville to institute an anti-mosquito campaign and pledging the Society's aid in conducting such a campaign.

The first subject of the evening was a report of the Florida Antimosquito Association's meeting at Daytona, by Dr. E. W. Berger. He spoke of the reports of the successful campaigns being conducted at Perry, Fernandina, and Miami. There were 150 people at the meeting.

Mr. Merrill gave a summary of the Boston entomological meetings. Dr. Berger read a letter from Prof. Fawcett who is in Russia with a Quaker relief unit.

Feb. 28, 1923. The regular February meeting was held in Language Hall with President Merrill in the chair. Members present were Stirling, Montgomery, Floyd, O'Byrne, Merrill, Berger, Brown, and Beyer, and Mr. Fred W. Walker and Mr. R. L. Trigg, visitors.

The address of the retiring president was given by Mr. Frank Stirling on "Commercial Entomology". The speaker presented a number of interesting phases which were discussed freely by those present. Dr. Berger exhibited an unusually strong colony of Vedalia on Cottony Cushion Scale. Mr. Walker and Mr. Trigg were elected to membership in the Society.

March 28. The meeting was called to order by the president, Geo. B. Merrill, with the following members present: Chaffin, Merrill, Hunt, Trigg, Ayers, Floyd, Montgomery, Watson, Berger, Rogers, Walker and Beyer.

Mr. A. H. Beyer, Business Manager of the FLORIDA ENTOMOLOGIST, gave a report on the finances which was approved by the Society and a copy was filed with the minutes.

The president called on the first speaker of the evening, Prof. J. R. Watson, who spoke on "Sulphur Dust for the Control of Purple Mite and Rust Mite". Prof. Watson pointed out the following interesting facts regarding dusting: that it is safer than spraying, no danger of burning foliage; the cheapness is an outstanding feature, only one-fourth the cost of spraying, no water to haul; and it covers the ground quickly—the greatest advantage. Disadvantages: no dust will control whitefly, therefore a spraying and a dusting machine are necessary for the same grove, a heavy expense to the small grower. Dusting may not last as long as the spray application. Mr. Yothers' dusting results were quoted where he recorded effective control of Purple Mite on citrus with a temperature of 95 or above but not at a temperature below 85. Prof. Watson also mentioned the lack of fertility of Blackberry hybrids often being laid to thrips injury.

The Vice President, Dr. Rogers, called on the next speaker, A. H. Beyer, whose subject was "Nicotine Dust for the Control of Bean Jassid and Pea Aphis". But two important phases of this paper were summarized owing to the short time: first, the method of application of dust; second, the importance of the strength of the dust. A duster producing a continuous flow of dust was found most satisfactory for speed and efficiency; a covering over plants to confine dust also found valuable. Dusts that were used gave best results where they were most heavily impregnated with nicotine sulphate ranging from 5 to 10 percent, in which case the nymphs of the bean jassid were largely controlled while the adults were not affected. The pea aphis was well controlled where the dust came in contact with the bodies of the insects.—A. H. Beyer, Secretary.

STUDIES ON ENTOMOGENOUS FUNGI

During the month of December the writer spent his vacation in Harvard University in the Department of Cryptogamic Botany studying the forms of entomogenous fungi collected in Florida the past year, with special attention to those which are parasitic on insects of ctirus. No study was made of the sooty mould fungus which occurs abundantly in different stages.

The fungi studied in this collection covered most of the species described from Florida. There was one exception however and this is an interesting fungus occurring sparsely under several different serial numbers in the writer's collection. It is a *Coniothyrium*-like growth. This fungus has good typical Coniothyrium spores, but the pycnidial walls are quite thick and almost carbonaceous. According to literature and authorities consulted it seems to be of rare occurrence, and it is thought probable that it may be a conidial stage of some well-known fungus, but thus far no connection has been traced with the forms commonly met on citrus. This form may be recognized by having small round dark spots, surrounded by, and occasionally filled with, spherical, somewhat pointed bodies, the pycnidia.

Another interesting note made in the course of the writer's taxonomic studies of his collection of *Microcera coccophilia* (Desm.) was that all specimens examined showed spores somewhat smaller than is general for this species. However they came within the measurements.—A. H. Beyer.

PERSONALS

(Continued from page 55)

vestigation of the effects of sulphur on the root knot nematode. He is also pursuing graduate work in the University and has undertaken the preparation of an annotated list of the Heteroptera of the Gainesville region. He is a graduate of Mississippi A. and M. College.

Mr. Fritz Fuchs has resigned from the State Plant Board to take charge of the grove of Mr. Frederick at Fruitland Park.

Mr. T. J. Iles of Crescent City reports that he finds lime-sulphur at rust mite strength, 1:70, applied at a pressure of 275 pounds, a very efficient control measure for mealy bugs. During the past three years he has sprayed 6,000, 93,000 and 45,000 trees respectively.

Mr. A. C. Mason has been transferred to Lindsay, Cal., to work on the California Citrus Thrips.

Mr. F. M. Bather, a member of the Brooklyn Institute of Arts and Sciences of N. Y., and Mrs. Bather, spent part of February in Gainesville collecting lepidoptera.

Other recent visitors to the campus were Prof. Lounsberry of South Africa and Prof. Craighead of the Pennsylvania Station, and C. B. Pierson of Los Angeles, Cal.

THE PALMETTO WEEVIL CATCHES A RIDE

Mr. Chris Waldron of East Palatka writes as follows: "Enclosed see specimen of a beetle found clinched fast on a five months' old chick's head, clinched so tightly that it seemed impossible to tear it loose without injury to the chick. I dropped kerosene oil on the beetle until it loosened." The insect was the palmetto weevil *(Rhynchophorus cruentatus)*. As this large beetle is over an inch in length and of corresponding breadth and thickness, it must have been something of a load for the chick. It would be interesting to know how the weevil happened to attach itself to the chick's head. Did the chick attempt to lunch on the beetle only to find the tables turned on him?

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IS THE ADULT CONDITION OF AN APHID DETERMINED WHEN IT IS BORN?*

ARTHUR C. MASON

Most aphids which are eventually to develop wings will, upon close examination, show wing pads, especially when approaching maturity. On some species these show distinctly, but on others not so plainly. Usually they are not very noticeable until the last instar preceding maturity. The question now arose as to whether the adult form of the aphids was determined when it was born. Was it possible to prevent, under favorable conditions, an aphid which had wing pads from developing wings, or to cause, through unfavorable conditions, an aphid without pads to develop wings? To determine this point some experiments were planned.

Twelve specimens of *Lachnus pini* in the first instar and showing wing pads were placed on a pine branch in a cage on the tree and allowed to mature. Also twelve specimens not showing wing pads were placed in a second cage. Of the first group all developed wings, while in the second lot there were both winged and apterous forms. A probable error in this work lies in the fact that it is not possible to tell exactly if a small aphid has pads and consequently some of this lot undoubtedly had pads while in the other lot only those were selected which plainly showed wing pads. This experiment was repeated the same way on cut branches of pine under bell jars in the laboratory. The results were similar to those of the preceding experiment, all of the first group developing wings while the second had both winged and apterous forms. The same probable error occurs here also.

A similar experiment was next tried with *Myzus persicae*. In this species however it is much harder to distinguish those hav-

*Continued from Vol. VI, No. 2, p. 32.

ing pads from those without them, until just before the last molt. However, some attempts were made to select some without and try to produce wings on them. Twelve immature specimens were placed on each of four cuttings of orange tips in sand. A and B were watered with a 3% magnesium sulphate solution, and C and D were watered with distilled water. The results showed both winged and apterous forms developed with a majority of winged in all cases. The number in the two checks was about equal to the number in the treated jars. A second trial using only one individual on each cutting produced similar results. Those on stems in magnesium sulphate solution were all apterous and those in water were half winged and half apterous. Four checks tied up on a limb of an orange tree resulted in three winged and one apterous. On these results it is probable that the cause of wing production was due to wrong selection of aphids rather than to a change of conditions. The checks also produced wings. It is practically impossible to select aphids of this species, when young which we can tell with certainty will not develop wing pads.

One more experiment was run on aphids of this species whose lineage was known. Four specimens of *Myzus persicae* were selected from the lines used in the life history work. Their parents had been apterous for four generations back. They were all kept on a cabbage plant until eight days old and then two of them, C and D, removed each to a separate orange tip in sand and watered with distilled water. The other two, A and B, were left on the plants for checks. All matured apterous. A and B together then raised 17 young on the cabbage plant of which sixteen were apterous and one winged. C on orange tip raised five young, all apterous. D on orange tip raised five young, four apterous and one winged. In the third generation raised from C and D there were together forty-six apterous and five winged aphids. Hence it is seen that even in the second and third generations the number of winged forms on the cut stems is not increased over those on plants growing naturally.

Alternation of Winged and Apterous Generations

The question arose as to the possibility of there being an alternation of one winged generation with one or more apterous generations. To investigate this point some colonies of the pine aphids were started on a small pine tree. Four winged adults reared a family the majority of which were apterous and four apterous adults reared a family the majority of which were winged. From each of these families some winged and apterous individuals were selected and the work continued for three generations. These results show that there is a distinct alternation of winged and apterous forms of *Lachnus pini*. In the case of four lines run for three generations there was in every case a majority of apterous young from winged parents and of winged young from apterous parents, and in some cases it was 100 per cent. This work was then continued by rearing the aphids on cut stems in the laboratory in both water and salt solution with checks on a growing tree. Here with one exception the same phenomenon was observed. In all, twelve winged adults from whom families were reared and counts of the offspring made produced an average of 72.1% apterous young; and in the case of six apterous females there was an average of 93.1% winged young. In several other cases of each form a majority was observed to exhibit this alternation of generations but no counts were made. As the results show, the cut stems had no influence in changing this proportion. So we conclude that even if the aphids are reared on unhealthy or dying stems the effect will not counteract the alternation of winged and apterous forms.

In practically all cases the first few young from a winged parent were apterous and vice versa. This may account for the fact that the percentage is perfect in some cases where the adult lived only long enough to raise a few young. The percentage of winged young from apterous parents is higher than that of apterous young from winged parents. The alternation of winged and apterous forms accounts for the fact that winged forms were observed in the field only at certain intervals. A winged adult might fly to a new tree and start a colony which would be all apterous. These would then produce families which would be largely winged. However, nearly a month would be consumed before the winged ones would become adult, during which time no winged forms would be seen, and then within a few days many winged ones would appear. This was observed on several different occasions.

SUMMARY

We can draw the general conclusion from all of these experiments that external conditions and environmental changes do not effect the production of winged forms of aphids, at least not in the first generation. This was proven by confining aphids on injured and dying pine trees; by raising aphids on cabbage plants show-

ing effect of injury and drought, by crowding aphids on a limb, and by adding chemical solutions to their food in growing plants, cut stems, and injections in growing stems. In no instance was a larger number of winged forms of aphids produced than in the checks living under natural conditions.

It is generally believed that an aphid will develop wings and fly away if its host plant dies or if crowding lessens the food supply and endangers its existence. In the case of mature pine aphids this was not found to be true. They all died when the host plant dried up. In fact it is unreasonable to believe that they can develop wings after maturity. Grove (19)[1] has made a careful study of the anatomy of winged and apterous aphids, and finds distinct differences, not only in external characters but also in the internal anatomy, such as the nervous system, the tracheal system, the size and shape of the alimentary canal, etc. Therefore, if an aphid were to develop wings due to unfavorable external conditions it must change its entire anatomy, and this probably is beyond the power of any organism.

A young aphid when born has its adult conditions as regards presence or absence of wings already determined, and no change of environment can effect this. First instar nymphs of both *Lachnus pini* and *Myzus persicae* which showed wing pads developed wings in every case, even though kept under the most favorable condition. On the other hand, young aphids which did not show wing pads developed apterous when raised under adverse conditions.

In the case of *Lachnus pini* an alternation of winged and apterous forms was determined. Although not exhibiting a perfect alternation, the offspring of each individual showed a majority of the opposite type. No changes in environment such as injury to host, crowding, or adding chemicals to the food of the host would change this alternation. A majority of apterous forms was always obtained from winged parents even under unfavorable conditions of life. With *Myzus persicae* and *Aphis gossypii* this alternation does not exist, since several generations were raised without securing any winged forms.

Kellogg (23) says that Clarke was able to produce winged forms of aphids at will by changing the sap of the host plant through addition of chemical salts. He used tip cutting of rose stems in sterilized sand and watered with solutions of magnesium salts of varying strengths. In this way he says he pro-

[1]Numbers refer to references cited.

duced winged forms of the rose aphid *Nectarophora rosae.* As shown above this was not true in the case of another species of rose aphid. No winged forms were produced even when the second and third generations were raised on cuttings in salt solutions by transferring the aphids from one cutting to another as often as they showed signs of wilting. In the same way three generations of *Myzus persicae* were raised on orange cuttings with no noticeable effect as compared with the checks on growing trees. Two generations of *Lachnus pini,* and one of *Aphis gossypii* were also raised on cuttings in solutions of magnesium, of sodium, and of citrus acid, and in all cases without results to substantiate Clarke's statement.

Morgan (24) in discussing Balbiani's work of raising sexual and parthenogenetic forms of aphids says that a female producing parthenogenetic young continued to produce them when placed on a dying stem. He concludes that food does not effect the mode of reproduction unless the organism is "predisposed to submit to its influence." In another paper Morgan (25) gives the results of several attempts to produce sexual aphids, and finally concludes that sexual forms are not due to external conditions, however important these factors may be in cyclical changes in sex production. We can also say the same regarding wing formation in aphids.

External conditions must require more than one generation to produce their effects, and when once effected the condition of that individual cannot be altered. Even in the second and third generations no positive results of their influence on wing formation were obtained.

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PERSONAL NOTES OF MEMBERS

We note from Baldwin-Wallace Alumnus that Dr. Carl J. Drake, head of the Department of Entomology of the Iowa State College, has just recovered from a severe attack of pneumonia.

Dr. H. L. Dozier has resigned from the U. S. Bureau of Entomology where he had charge of the Camphor Scale investigations, to take the position of Entomologist to the Gulf Coast Citrus Exchange with headquarters in Mobile.

According to the Official Record of the U. S. D. A., Mr. John Graf has been made acting head of truck crop insect investigations of the Bureau of Entomology.

Mr. F. F. Bibby has been transferred from Tlahualilo, Dugango, Mexico, to Brownsville, Texas.

J. C. Goodwin is the proud father of a young entomologist.

U. C. Zeluff, the Plant Board Quarantine Inspector stationed at Tampa, has recently intercepted the Mexican orange maggot in a shipment of Mexican oranges from Tampico, Mexico.

D. Marston Bates, youngest member of the Entomological Society, has perhaps the largest collection of lepidoptera in the Southeast. Mr. Bates is but seventeen. He lives at Ft. Lauderdale.

Jeff Chaffin has returned to Gainesville after spending several weeks in Lafayette County, where he was engaged in demonstrating the Florida method of boll weevil control.

Wm. J. Rahn has been employed by the American Fruit Growers Inc. and is located at Wabasso.

J. L. Lazonby is engaged in quarantine inspection work for the Plant Board at Jacksonville.

Chas. A. Reese, formerly Assistant Apiary Inspector of Florida, has moved to Columbus, Ohio.

The
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SOUTHERN MIGRATION OF BUTTERFLIES

FRANK STIRLING

Not in many years has the southern migration of the Great Southern White, or Gulf Butterfly *(Pieris monuste* L.), been quite so great or noticeable as during the early part of June of this year (1923). Their numbers along the waterways of the east coast of Florida, especially along the Halifax and Indian Rivers, were so great that the radiators of automobiles driving north and south became thoroughly plastered with them. The migration is constantly southward and one wonders where this tremendous army comes from. It seems that they are first noted in large numbers in the vicinity of Titusville and as one travels southward their numbers seem to increase until they reach unlimited millions between Fort Pierce and Stewart, with an apparent increase in numbers as they advance southward. Always they are noted as flying thickest along the edges of the water, such as the two rivers above mentioned, Lake Worth, the East Coast Canal and Biscayne Bay. There they apparently leave the mainland and follow the Gulf Stream to no one knows where. It is not unlikely that these butterflies begin to make up the bulk of their army in such states as the Carolinas and Georgia, for they have been reported in the vicinity of Jacksonville, Florida, on their journey south.

It is observed that numbers of these butterflies occur some three to five miles west of the inland waterways and are always flying eastward, apparently for the purpose of joining the main army in the southward flight. It is not unlikely that many of these butterflies breed and hatch in certain portions of the swamp lands and Everglades of the interior; also in farms and fields where cabbages and collards are grown. These butterflies, upon reaching maturity, apparently follow instictively the eastward march until the main army is met. On June 8 they were noted in greatest numbers along the coastal sections of eastern Florida and on June 9, 10 and 11 millions of them were noted by travelers coming from Nassau, Bahama Islands, fluttering above the Gulf Stream heading southward.

It would be extremely interesting to understand the purpose of such migrations: where the butterflies come from, that is, how far north do they begin to gather and migrate and where is the place for which they are headed. Is it Cuba, or South America, or do most of them become exhausted and consequently a prey to fish in their journey over the ocean?

But little is known in regard to the food plants of the caterpillars of these butterflies. They may feed on some wild species of plants related to the cabbage and mustard. Noting that so many appear from the Everglades, it is not unlikely that some native host growing in that section of the state is responsible for the breeding of great numbers.

THE PROPER NAME AND DISTRIBUTION OF THE FLORIDA FLOWER THRIPS*

J. R. WATSON

In the literature on Florida insects prior to 1913 our flower thrips was not distinguished from the northern species *Frankliniella tritici* (Fitch), then called *Euthrips tritici* Fitch or *Thrips tritici* Fitch. For instance, Quaintance in Bulletin No. 42 of Fla. Agric. Exp. Sta. refers to a thrips damaging strawberries at Lake City under that name. But his Figure 4, from a microphotograph, shows the second antennal segment with sufficient clearness to prove that it belongs to Morgan's *bispinosa*. Furthermore the known distribution of *tritici* in Florida would make it very improbable that it was the dominant species attacking strawberries as far south as Lake City.

In 1913 Morgan, (Proc. U. S. Nat. Mus. Vol. 46, p. 10) described *Euthrips tritici bispinosa* from four females taken at Dade City. As distinguishing characters he named: (1) the color, "pale yellow shading to gray on sides of head and abdomen." (He does not mention any orange color probably because he described alcoholic specimens.) "Tip of abdomen not darker than remainder of body." (2) "Tip of second (antennal) segment raised dorsally and bearing two exceptionally heavy dark

*Paper presented at the May meeting of the Society.

brown spines." (3) "Segments 3 and 4 relatively much more slender than in *E. tritici*."

Later Hood raised Morgan's variety to specific rank and transferred it with *tritici* and other species of *Euthrips* to Karny's genus *Frankliniella*, naming our insect *Frankliniella bispinosa* (Morgan), and this is the name that has been used by the writer until more data could be collected.

As bearing upon the subject of the specific rank of *bispinosa* two questions needed investigation. Are there transition forms between *bispinosa* and *tritici*, and do the two forms overlap in distribution? Not until recently were we able to gather evidence bearing upon these questions. Specimens sent in from Mississippi, Louisiana, Alabama, and Atlanta, Ga., always proved to be typical *tritici* and all specimens from Florida typical *bispinosa*. During the last few months, however, we have examined a large series from Escambia County in extreme west Florida and from several points in extreme southern Alabama, Mississippi, and Georgia.

An examination of some hundreds of specimens of both forms shows that the color differences as described by Morgan are valueless. There are no constant color differences. Apparently Morgan's description was from alcoholic specimens from which the orange color had faded. *Bispinosa* has fully as much orange as *tritici*, perhaps more. The dark spot on the tip of the abdomen is a variable character present in many specimens of *bispinosa* and absolutely worthless as a distinguishing mark. There remains only the comparative lengths of the third and fourth antennal segments and the dorsal elevation and the two heavy spines of the second antennal segment. In typical *triciti* there is no such elevation. The segment is symmetrical in side view. Also the two spines on the dorsal surface are no heavier than those on segment 3. In both these characters some specimens from extreme western Florida and Gulfport, Miss., are intermediate. Some of these cannot with certainty be placed with either form. Some have the second antennal segment of *bispinosa* but the short third and fourth segments of *tritici*. The lengths of segments 3 and 4 are more variable than the two heavy spines of segment 2. These spines form the most constant distinguishing mark between the two forms.

Since the only characters of any value are those of the three antennal segments and these intermediate in many specimens it would seem that *bispinosa* hardly deserves specific rank as given by Hood but that it should be considered as a mere variety, though a well-marked one, as originally given by Morgan, and that its proper name is *Frankliniella tritici bispinosa* (Morgan).

In size *bispinosa* averages a trifle smaller than *tritici*. The average total length of several hundred measured was 1.1 mm., while the average of all the tritici in the writer's collection is 1.15 mm. On the other hand, where the two forms meet at Cottage Hill *bispinosa* measured 1.25 mm., while *tritici* averaged 1.09 mm. and at Loxley, Ala., only 1.03 mm. *Frankliniella cephaalica masoni* averaged only 1.02 mm.

In regard to the distribution of the variety most of the specimens from Cottage Hill, Escambia County, Fla., were *bispinosa*, but there was a minority of *tritici*. In a collection from as far east as Panama City there were a few *tritici*. On the other hand, a collection from Loxley, Ala., was mostly *tritici* with a sprinkling of bispinosa and the same was true of several collections from near Gulfport, Miss., sent in by Mr. E. K. Bynum of the State Plant Board of Mississippi. It would thus seem that in the west there is a remarkably close coincidence between the dividing line of the two forms and the boundary of the state. On the northern border a collection taken a few miles north of Valdosta, Ga., by F. W. Walker were all bispinosa, while specimens received from Atlanta were all tritici.

We have thus in Florida three yellow, flower-inhabiting thrips of the genus *Frankliniella*. The most common one is *F. tritici bispinosa* (Morgan), which ranges over the entire state and extends but little over the state line in the west but well up into Georgia. *F. tritici* (Fitch) comes into the western end of the state in small numbers. In the south but ranging in small numbers as far north as Daytona is another species, *F. cephalica masoni*. Wats.

ENTOMOLOGICAL NOTES FROM BRAZIL

"The other day the young fellow who is working here in the enclosure as a care taker of the plants hollered for me to come and help him with a big "bicho!" When I got there I found it was a Buprestid that measured over six centimeters in length. Some time ago the servant's daughter brought us a Prionid that measured over eight centimeters in length, not including his antennae.

"We had spent lots of time and exercised lots of care in getting some really magnificent things that Mr. Haddon took through for

Mr. Van Hyning. But then you know that Mr. Haddon made the fool blunder of placing them in the mail for the last lap of the journey, in spite of the fact that I had warned him and specifically instructed him to send them by express. I knew of course that if they were sent in the usual envelopes and folded in the usual way that Mr. Van Hyning could not possibly get time to take care of them for years to come.

"The last four weeks have been unusually prolific ones in the way of collecting moths at the electric light. Most of them are of medium or small size but a lot of them very fine and interesting. We have gotten a couple of larvae of very large and interesting Sphingidae. Lately the Heliconidae butterflies have become quite abundant. Clarissa got some rather interesting ones today. Yesterday I saw one specimen of the clear-winged Heliconidae. I had no net with me so could not get him. The day before I had seen two of that species at Ponte Nova. The chrysalis of one of these Heliconidae is of burnished silver, about as bright as a mirror. It takes only about a week from the time of pupation until the butterfly emerges. The other day I got fourteen of them from a single *Sylanium*. For the last three or four weeks leaf-hoppers have become very abundant at the light. Apparently they are of quite a number of different species. At the beginning of the rainy season I made some sweepings over grass plots but caught practically no leaf hoppers."

P. H. ROLFS.

April 3, 1923.

REPORTS OF MEETINGS OF THE SOCIETY

April 30, 1923.

Society met in Language Hall with Vice President Rogers in the chair. Members present: Ayers, Berger, Beyer, Brown, Burger, Chaffin, Merrill, Mowry, Montgomery, O'Byrne, Rogers, Stirling, Trigg, Walker, Watson. Visitors, Jenkins, Link, and Heuse.

Mr. Ayers gave the first paper on "Insect and Plant Disease Problems Occurring in the Field." Among the insect problems mentioned by Mr. Ayers were the camphor scale, flower thrips, celery leaf-tyer, and garden flea hopper. Spraying was done for the control of thrips. Poisoned bran bait moistened with nitro-benzine was used with success on the leaf-tyer. Calcium cyanide dust was also used for control of the leaf-tyer, as well as the garden flea hopper. It was thorough and effective in its control of the latter but not the former.

A. H. Beyer, the next speaker, reported an infestation of *Aphis maidis-radicis*, on the roots of watermelons collected by Prof. Watson near Live Oak. He also discussed the difficulty in the control of this pest.

Under "Brief and Timely Notes" Dr. Montgomery mentioned Baker's mealy bug, as being a probable threatening pest to the grape industry of Florida.

May 25, 1923.

Society met in Language Hall with President Merrill in the chair. Members present were Berger, Beyer, Brown, Merrill, Stirling, Stone, Trigg, Walker, and Watson. Visitor, Mr. Link, who was elected a member of the society.

The first subject was a round table discussion of the proposed anti-mosquito campaign in Gainesville, led by F. M. O'Byrne.

The speaker first discussed the effect on the health and comfort of the community as well as real estate values and civic pride. He reported that the Gainesville Board of Health had adopted the Model Mosquito Ordinance which was adopted by the State Board of Health, and that the campaign was costing about $500, which is being expended for inspectors, etc. Lack of funds prevents any drainage work being done at present. Among the mosquito breeding places discussed, which should be abolished or oiled, were barrels, bottles, tubs, pans, and tin cans. They were also found breeding in septic tanks, storm sewers, holes in bark of trees, cup depressions on exposed roots of trees, seepage places in land, and bodies of water where minnows and other enemies of the mosquito do not occur.

The next speaker, Professor Watson, spoke on the proper name for the Florida flower thrips.

A. H. BEYER, Secretary.

THE SYCAMORE LACE-BUG

It was late September and the Florida landscape was one unbroken green. Drenched by the almost daily showers and heavy dews of the rainy season which had just closed, the grass was at its greenest. The weeds of the neglected fields and other waste places had as yet hardly commenced their automn carnival of color. The native trees, too, except for an occasional half-drowned red maple or sour gum in a flooded swamp, had scarcely turned a leaf. In vain did the tired eye seek a bit of color in this monotonously green landscape. But there was one exception. The sycamores planted along our streets and lawns were brown, sear and half bare. Why should they alone of all the trees on well-drained land be dropping their leaves? Let us examine the withered foliage. On the under side we find numerous reddish brown stains—so characteristic of tingids. A closer scrutiny and we see, in the middle of some of the fresher stained areas, the bugs themselves. Under the lens the entire body is seen to be covered with the most delicate net of thickened veins and ridges which gives these insects their name of lace bugs. And they or their stains were on every leaf. What a fearful epidemic is this! The worst human epidemic of which we have any record, the plague or black death of medieval Europe, is said to have taken over half of the population. But here is an epidemic which has taken nearly 100%. And it is a yearly event. Luckily for the trees it occurs late in the season, after much of the work of the leaves is done. Still it must be a handicap to the sycamore tree and one wonders if this may not be one of the reasons why the sycamore does not grow wild in our hammocks.

THE HOST OF THECLA HALESUS

While in Gainesville last March Mr. Geo. B. Pierson, an enthusiastic butterfly hunter of Los Angeles, Cal., captured a caterpillar feeding on mistletoe. After leaving Gainesville Mr. Pierson was successful in raising this caterpillar to maturity. It turned out to be the hair streak butterfly, *Thecla halesus*. Holland in the "Butterfly Book" states that not much is known of the early stages but quotes Abbott to the effect that it occurs on oaks.

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CITRUS CONDITIONS IN THE RIO GRANDE VALLEY AND THE SATSUMA SECTIONS OF ALABAMA TOGETHER WITH ADDITIONAL NOTES ON SAN JOSE SCALE SITUATION IN NORTHWESTERN ARKANSAS

By

W. W. YOTHERS, Bureau of Entomology*

Orlando, Florida.

INTRODUCTION

The visit to the Rio Grande Valley was made under the auspices and on the invitation of the Extension Division of the Texas A. & M. College. A year ago they conducted a citrus school and it met with such success that it was decided to hold another one this year and it was held from June 25th to 30th inclusive. The object of the school was to give the citrus growers information regarding the diseases and insects and methods for their control. During the week somewhere around a thousand people attended the lectures at the various places.

General Conditions. The soil of the Rio Grande Valley is very fertile and citrus trees make a marvelous growth. Nursery trees one year old are much larger than are trees of the same age in Florida. The average 4-year old grove was as large as a 7 or 8-year old grove grown uder the average Florida conditions. In fact some of the trees planted 20x20 feet, 4 years ago, have branches which now meet.

Owing to the uneven distribution of rainfall throughout the year it is necessary to irrigate the trees in order to insure proper growth. The water for this purpose is pumped from the Rio Grande. As yet the gravity system is not in operation but

*Paper read before the August meeting of the Florida Entomological Society.

a strong movement is on foot to bring about such a system of irrigation and no doubt in a few years not only will the present groves be irrigated by the gravity system but also great acreages in addition. So far as I could learn the cost of irrigating a grove varies from $10.00 to $12.00 per acre per year. No doubt the cost is different in different districts. Since the valley is near Mexico an abundant supply of labor is always available and the prevailing wage is one dollar per day for common labor.

Extent of Industry. According to the best information obtainable, 1,700,000 citrus trees have been planted during the past few years. This would be about 25,000 acres figuring on the basis that the trees were planted 20x20 feet. As yet the production of fruit has not been great but prospects are good for ten or twelve thousand cars within the period of 4 years. In fact this is the estimate given by the president of the Valley Citrus Exchange.

Varieties and Root Stocks. The Parson Brown, Pineapple and Valencias seem to be the varieties of oranges usually planted, while Duncan and Marsh Seedless were the leading varieties of grapefruit, 80% of the plantings consisting of grapefruit and only 20% of oranges. With one exception all of the citrus growers with whom I talked in the Valley are of the opinion that neither trifoliata nor lemon stock have any value for the growing of citrus trees in the Valley. Practically all the plantings are now on sour orange stock.

Injury from Winds. The injury caused by the winds is very great. A large part of the foliage on young trees is blown away and most of these trees are very much lop-sided. The foliage on the outside rows on the south and east sides of most groves is usually very sparse, due to the injury from winds. The fruit also is very badly blemished by being blown around so violently as to cause mechanical injury. In fact I rather thought that 99% of the blemishes seen in the Valley were caused by winds.

Diseases. Although an extensive search was made for melanose not a single spot was found in the entire Valley. Citrus scab was very serious on some sour seedlings in a nursery but the grapefruit trees did not seem to be seriously effected with this fungus disease. In one grove I saw what I presumed to be foot-rot and one case of a disease simliar to frenching was observed.

Insects and Mites. Since citrus trees have been shipped into the Valley from both Florida and California is is only natural to expect that the same insect pests which are present in both of these localities should also be present in the Valley. Such is largely the case and we find about the same scale insects and mites present as in both Florida and California. The Florida red scale is supposed to be the most injurious scale present. It seems to thrive in the hot dry climate. Next in importance is the California red (this may be dictyospermum). This scale was observed in a grove, the trees of which were purchased in California, in great abundance. In fact this scale had nearly killed this entire grove which was only saved from total destruction by the use of oil emulsion two or three times last winter. The chaff scale, *P. pergandii,* does great damage to the twigs and trunk and no doubt is the third most injurious scale insect. The long scale, *L. gloverii,* is the fourth in importance and does much more damage than the purple scale. The purple scale is also present but I presume the sun is too hot for its proper development in great numbers. I understand the citrus white fly is present at Brownsville but I did not see it myself.

The citrus rust mite is present in the greatest abundance in the Valley. It often becomes so abundant that the limbs turn blue and the leaves take on a brown color and, in many cases, do not reach normal size. The fruit on several groves was badly russeted and in many cases the living mites and eggs were present on the fruit in countless numbers.

Even though rust mites are extremely abundant they can be very easily controlled by means of dusting with sulphur. Owing to the infrequency of rains the sulphur would remain on the foliage for long periods of time and sufficient to kill rust mites would no doubt be present until a rain came and washed it from the trees.

Entomogenous fungi. None of the entomogenous fungi attacking scale insects were observed. Neither the county agents nor Mr. E. W. Halstead had ever seen them in the Valley excepting on nursery stock when received. No doubt these fungi have been introduced many thousands of times and owing to the adverse climatic conditions have never established themselves. I did not find out if our Florida fungus on rust mites was present. Neither the citrus red spider nor the six-spotted mite, T. sexmaculatus, were observed. Another red spider, however, of a greenish tinge with dark spots on its back was observed at McAllen. I am of the opinion that this is the same red spider as the one taken by me on some temple oranges at Homestead, Florida, in W. J. Krome's grove.

A local man was making the Government formula oil emulsion for controlling scale insects. The grade of oil being used was too light for best results and specifications of a better oil were given to him. They have already established a citrus experiment station in the Valley for the purpose of taking up the problems relating to the industry. No doubt this will solve many of the problems and difficulties which now seem almost insurmountable to the citrus growers.

Even though trees make a much more vigorous growth and labor is less than half what it is in Florida and no fertilizer has been required up to this time, the hazard from cold may outweigh the advantages above enumerated. Due to this cold hazard most of the growers will arrange for firing in case of necessity.

SATSUMA CONDITIONS IN ALABAMA

The satsuma industry in Alabama is in a flourishing condition with prospects this coming year for an increased yield over that of the past season. The Gulf Coast Citrus Exchange has employed Dr. H. L. Dozier to handle its insect and spray problems. Dr. Dozier has approached the situation with enthusiasm and vigor and no doubt his work will be exceedingly profitable to the members of the Exchange. One of his main objects is to teach the citrus growers the recognition and biology of the citrus pests. This is being done by lectures, personal interviews and writing for the Gulf Coast Citrus Grower. It is also his intention to carry on as much research work relating to sprays and insect biologies as time will permit.

SAN JOSE SCALE CONDITIONS IN NORTHWESTERN ARKANSAS

In Northwestern Arkansas I visited Messrs. Ackerman and Pierce, who showed me large acreages of apples which had been completely killed by the San Jose Scale and thousands of other trees which had been most severely damaged. The entire apple industry would have been wiped out in the Ozark district if these scientists had not introduced the oil emulsions. The apple-growers and business men are highly pleased with the results of these emulsions in the control of this scale. They use a heavy oil for making the emulsion and it retails for $12.00 a barrel which is less than half what Florida growers pay for emulsions made out of lighter oils.

THE GENERIC AND SPECIFIC NAME OF THE ORANGE RUST MITE

Some confusion has arisen in regard to the proper generic name for the orange rust mite and also the proper spelling of its specific name.

The generic name *Typhlodromus* under which the mite was originally described does not appear in recent literature on the gall mites and is not mentioned in either Nalepa's 1898 monograph of this group or in his extensive 1911 monograph. This genus was established by Scheuten in 1857 for the pear leaf blister mite, now known as *Eriophyes piri* (Pgst.). In Scheuten's paper the name of his proposed genus is neither set off by a center heading or a paragraph heading, hence has undoubtedly been overlooked by most entomologists. Being monobasic and having *Eriophyes piri* (Pgst.) as a type, the genus is evidently only a synonym of *Phytoptus* Dujardin (1851), which in turn is a synonym of *Eriophyes* Siebold (1851).

Notwithstanding the fact that the orange rust mite clearly belongs to the genus *Phyllocoptes*, which genus was established by Nalepa in 1889, it is sometimes mentioned as being an *Eriophyes*, if perchance neither of the two untenable names, *Typhlodromus* or *Phytoptus*, are used. The reason for this is not hard to find. The drawing of this species given by Hubbard many years ago, which drawing frequentily has been copied in more recent years and which is the only drawing of this mite with which most entomologists are familiar, actually represents the species as being an *Eriophyes!*, *i. e.*, all of the abdominal rings are shown as being complete rings, whereas in reality half of them are only half rings.

The proper genus for this mite is clearly *Phyllocoptes* Nalepa.

The spelling of the specific name of this mite also varies. In accumulated notes and papers it has been spelled *oliioorus*, *oleivorus*, *oilivorus* and *oil-livorus*. The first mentioned is the spelling under which the species was described. Evidently it was badly garbled either in manuscript or in the printing of the same. In Ashmead's notes accompanying the original description of the mite mention is made of its feeding on the oil of the orange, hence the supposition has been that he intended to indicate this fact in the name proposed. All of the renderings of the name, other than the original spelling, seem to indicate this intention, but unfortunately not everyone would form the name in the same way.

If a subsequent paper published by Ashmead in his "Orange Insects", only a year after the publication of this original description of the mite, had not been so commonly overlooked, this confusion would have been largely avoided. In his "Orange Insects," published in 1880, there occurs on page 40 the following sentence: "I immediately began to study it (the rust mite), and soon after wrote him (Rev. T. W. Moore) that I had discovered what it was and forwarded a description of it for publication, crediting him with the discovery, under the name of *Typhlodromus oleivorus, i. e.,* oil eating from supposing it to feed on the essential oil of the orange."

Thus the earliest amended spelling of the specific name, and in this instance the more properly formed, is *oleivorus.* The proper scientific name for the orange rust mite, therefore, is *Phyllocoptes oleivorus* (Ashmead).

H. E. EWING
U. S. Bureau of Entomology.

A GEOMETRID LARVA ON GRAPEFRUIT

The writer has recently received a number of larvae of the Geometrid moth *Microgonia vesulia* Cramer which were collected on grapefruit trees. The larva is not apt to be confounded with anything else, being a large gray looper, fully four inches long when mature. The majority of the larvae were parasitized by a Tachinid fly, and only the very young larvae lived to produce moths. These parasites will probably prevent the insect from ever becoming of any importance as a pest.

I am indebted to Mr. F. H. Benjamin for the determination. The moth is figured by Holland (Moth Book, pl. XLV, f. 11) under the name *Oxydia vesulia.* Grossbeck (Insects of Fla., IV, p. 102) gives the food plant of the larvae as oak. According to these authorities it is found over south Florida, and extends to Texas and through Mexico and the Antilles to Brazil. A series of the bred specimens is preserved in the author's collection.

D. MARSTON BATES.

PERSONALS

New members of our society are T. H. Hubbell and John Gray. Prof. Hubbell comes to assist Dr. Rogers in the teaching of entomology in the University. He is an ecologist and particularly interested in orthoptera. Mr. Gray is Professor of Economic Entomology and Pathology in the Agricultural College.

Mr. D. Marston Bates of Ft. Lauderdale, the youngest member of our society and an earnest student of microlepidoptera, has entered the University. He is also working as part time assistant in the Department of Entomology of the Experiment Station.

Mr. R. L. Trigg has resigned his position as research fellow for the National Research Council located at the Experiment Station to accept a position with the Federal Horticultural Board. He will be located at New York. Mr. Trigg has secured some valuable data on the influence of sulphur on the root-knot nematodes.

Reginald Hart has been acting as assistant to the entomologist of the State Plant Board during the absence of Mr. Geo. Merrill on a short vecation in the Carolinas.

Among the publications recently published by our members are two by Dr. H. S. Davis of the U. S. Bureau of Fisheries on diseases of fish and three by Dr. Carl J. Drake in Technical Publication No. 16, of the N. Y. State College of Forestry.

Mr. A. H. Beyer recently visited Lakeland Highlands where "pumpkin bugs", *Nezara viridula,* were doing much damage to citrus. They were killing limbs of grapefruit trees an inch or two in diameter. They attack the upper side of limbs bending under the weight of fruit at the point of maximum bending, where it seems to be easier for them to pierce the bark. This type of injury was first brought to our attention last year. The infestation was due to a crop of cowpeas that was allowed to grow until about the first of October instead of being cut by the middle of September as has been recommended.

A recent correspondent writes concerning the "fungas" in his grove. A member of the Board of Control once said that Dr. Berger is the man who put the fun in fungus. Who inserted the gas?

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THE SCALE INSECTS OF FLORIDA

The last number of the Quarterly Bulletin of the State Plant Board of Florida (Vol. VII, No. 4) consists chiefly of an illustrated catalog of the scale insects of Florida by Geo. B. Merrill and Jeff Chaffin. This is a very valuable reference work which should be in the hands of everyone interested in the insects of Florida.

NATURAL CONTROL OF ANTS

A fruit grower in attendance at the Farmers' and Fruit Growers' Short Course reported a novel method of controlling ants nesting about the bases of young citrus trees where the use of solutions of sodium cyanide or carbon disulphide would be unsafe. He collects a number of ant-lion larvae ("doodle-bugs") and liberates them about the bases of the infested trees. The larvae at once "dig in" and construct their deadly funnels. The result is a prompt and satisfactory clean up of the ants.

A PROMISING NEW BAIT

It has been found that a flavoring of nitrobenzine added to the poisoned bran bait (25 pounds of bran thoroly mixed with a pound of paris green) is very attractive to a variety and large range of insects. It was first tried by U. S. D. A. workers as a bait for web-worms (*Crambidae*). The Experiment Station found it quite attractive to the celery leaf-tyer at Sanford. The Official Record of the U. S. D. A. for July 18, 1923, reports its successful use against tobacco wireworms at Clarksville, Tenn. If it is attractive to such diverse insects as wireworms and caterpillars it is quite possible that it will be found of value against a large number of insects. It is at least worthy of a trial against almost any biting insect.

THE BUMBLE BEES OF FLORIDA[1]

P. W. FATTIG

Altho there are 58 species of Bombidae in the U. S.,—47 of the genus Bombus—the true bumble bees, and 11 of Psithyrus—the parasitic bees; only five species, four Bombus and one Psithyrus, occur in Florida. Thus it is seen that these bees are but poorly represented in Florida. They are most abundant in the Rocky Mountains. The following key will enable the reader to separate our species.

A. Outer surface of hind tibiae convex and hairy; face of males black ..... **Psithyrus.**
   Abdomen of female entirely dark; that of male very variable ..... **P. variabilis.**

AA. Outer surface of hind tibiae of female concave and smooth; face of male usually with yellow ..... **Bombus.**
   a. Thorax with a distinct black band.
      b. First and second segment of abdomen yellow ..... **B. fraternus.**
      bb. First, second and third segments of the abdomen yellow ..... **B. pennsylvanicus.**
   aa. Thorax without a distinct black band.
      b. Dorsum of the abdomen with the first segment yellow and the remaining segments black ..... **B. impatiens.**
      bb. Dorsum of the abdomen with the first segment yellow, the second segment more or less brown-ferruginous on the basal portion, especially in the middle—the remaining segments black ..... **B. separatus.**

B. fraternus nests in the ground or in holes in stumps or trees at the level of the ground. It is one of the most pacific of the bumble bees. Its coloration is very constant.

B. impatiens also nests in the ground.

B. pennsylvanicus nests on top of the ground, usually in old mouse nests and similar situations. Occasionally the nests are subterranean.

B. separatus nests in the grass on the surface of the ground. It is one of the most pugnacious of bumble bees when its nest is attacked.

Bees of the genus Psithyrus are parasitic on the true bumble bees which they mimic in color and actions. Usually they mimic most closely the species of Bombus on which they are parasitic. The Psithyrus queen enters the Bombus nest and kills the queen. The young Bombus bees then adopt the Psithyrus queen, feed her and tend and raise her brood.

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[1]Abstract of a paper read before the Fla. Entomological Society March, 1920.

FOOD HABITS OF THE PECAN TWIG GIRDLER

In the latter part of October Mr. Robert R. Thompson of the Palmer Corporation at Sarasota sent to the Experiment Station specimens of an insect that was severely pruning his roses. It was the hickory twig girdler, *Oncideres cingulata*. This is the first instance of its attacking roses in Florida that has come to our attention altho Felt, in "Insects Affecting Park and Woodland Trees", records it as an occasional pest of roses. In Florida in addition to hickories, including the pecan, which are its normal hosts, it frequently attacks Japanese persimmons and Australian pines, *Casuarina equsetifolia,* and occasionally the water beech, *Carpinus Carolinana,* and citrus trees. In the northern states it commonly attacks elms. Felt also lists oaks, apple, plum, linden, pear, and peach. A peculiarity of their attacks upon Australian pines is that they seldom lay any eggs in the girdled twigs. Evidently the stimulus of the tree (which is not really a pine) excites, thru smell, sight, feel, or other sense, the girdling instinct but not the egg-laying instinct.

"BRAZILIAN ANT EATERS"

P. H. ROLFS

Friends and Associates or the Florida Entomological Society:

I send you words of greeting from the land of the lure, where the skies are higher, where the stars are more numerous in the sky, and where the Southern Cross shines every night to remind one of his duty to his fellow man. Brazil, the land where great rivers flow without having names, where mountain ranges occur that are not even indicated on the maps. This vast interior is really the Brazil. Rio de Janeiro, Sau Paulo, and the other large coastal cities are merely cosmopolitan conglomerations like New York, Chicago and New Orleans. One has to get away from these cities to really know and appreciate the Brazil for what she is. Three million people could live in this territory and find themselves less cramped than a hundred million in the United States.

Well, what I started out to write you about was the ant eaters of Brazil. At first you will say that this is not an entomological problem. Maybe the eating of honey is not an entomological problem, but even entomologists condescend at times to satisfy their gastronomic longings for that delicacy.

THA SAUVA (Atta sexdens, L.)

The destructiveness of this species is attested in all agricultural countries in tropical America, ranging from Texas to Argentina. It is the "billion dollar insect", destroying far more than the boll weevil, with which the Florida entomologists are quite familiar.

The formicaries of this "bicho" are often from six to eight meters across and the range of the activity of the ants from one nest may be as great as a hundred meters. Frequently they connect their formicaries with the field in which they are cutting by long tunnels. I have a photograph of one formicary that went to a depth of more than four meters.

Naturally formicaries of this size can breed a great quantity of sauvas, and each year produce thousands of tanajuras (queens). During the spring (October and November), after the rains have commenced, these tanajuras make their nuptial flight. Fortunately the distance they fly from the formicary is not great. The largest number of them alight within one hundred meters of their birthplace. After divesting themselves of their wings these new queens begin to excavate and then commence a new colony. Each one carries with her enough "ambrosia" to care for herself and progeny until the first set of workers are ready to bring in the organic matter on which to plant the mushrooms.

EATING TANAJURAS.

These tanajuras are of a considerable size. With their wings folded back they measure from four to six centimeters. Their wing-spread is six to seven centimeters. Just after they have shed their wings the tanajuras are considered a particularly appetizing morsel. We had been told repeatedly that the aborigines ate them, and that some of the country people cooked them. So we made particular inquiry to find out how this particular feat was accomplished. It seems that the regulation way is to pull off the heads and fry the abdomen and thorax in hot fat. So Mrs. Hargrave (nee Effie Rolfs) prepared some of them for us. While in the hot fat, the abdomens burst, sounding and appearing very much like popcorn. In eating quality, too, they are about like good popcorn, crush readily and give off a rather pleasing, evanescent aroma.

Mrs. Long, a teacher in the Methodist Missionary School at Juiz de Fora, tells us that she has frequently seen the moleques (negro urchins) in the school there pull off the heads and wings and eat the remainder with a great deal of gusto.

There is no reason why one should have a great aversion to eating tanajuras. They are absolutely cleanly about their formicary. For thousands, possibly millions of generations they have lived upon nothing but mushrooms. They are much more cleanly and certainly more appetizing in appearance than either oysters or shrimp, though of course their color is somewhat dark, almost black.

If any of you are "from Missouri" on this proposition, just make us a visit next spring (October or November) and we will give you an opportunity of changing your mind.

REPORTS OF MEETINGS

August 9, 1923.—A special meeting of the Society was held during Farmers' and Fruit Growers' Week at the University. A large number of visitors and members were present. President G. F. Merrill presided. The paper of the evening was by Mr. Yothers on "Citrus Conditions in the Rio Grande Valley of Texas and in the Satsuma District of Alabama". This paper is printed in full in this issue of the Entomologist.

September 21—A meeting of the Society was held during County Agents' Week.

Meeting was called to order by the temporary chairman, J. R. Watson. Members present, Beyer, Briggs, Burger, DeBusk, Gomme, Kime, Link, O'Byrne, Warren and Watson. A large number of visitors were also present.

The subject of the meeting was "Most Important Insect Problems and Their Control." This was discussed by a number of the county agents.

The first speaker, E. F. DeBusk, Extension Citrus Pathologist, formerly county agent of Lake County, spoke of the aphid injury to the watermelon crop and control measures. He brought out very strongly the idea of agitation for a bill to the legislature to standardize spray materials.

Wm. Gomme of Polk County also spoke of watermelon insects and stated that in his opinion spraying was more efficient than dusting. He spoke of Florida Red Scale as being particularly bad. Spray burn from oil emulsion was noticed from June to October. He also commented on the serious infestation of mealy bugs the past season, but declared that it was brought under good control by means of the parasite Paraleptomastix, distributed by the Experiment Station.

C. D. Kime of Orange County mentioned about the same troubles as the former speakers, but added rust mite injury.

W. R. Briggs of Manatee County told of controlling aphids on peppers by means of nicotine sulphate. He had success in controlling the Garden Flea Hopper with kerosene emulsion.

Alfred Warren of St. Lucie County spoke of the Florida Red Scale as a puzzling insect.

J. S. Rainey of Dade County brought out the idea that control work is more or less regulated by the market price of fruit; as a result the groves have been neglected. He considers avocados of primary importance and thinks citrus will become secondary. He expressed the opinion that spraying or dusting of fruit should be made compulsory by law.

General discussion followed and the meeting adjourned at 6:00 p. m.

October 31.—The Society met in Language Hall at 4:30 with President Merrill in the chair. Members present were, Ayers, Bates, Beyer, Berger, Chaffin, Floyd, Goodwin, Hart, Merrill, O'Byrne, Walker, and Watson. Following a rather extended business meeting Mr. Reginald Hart spoke of his work on an insect survey of the lower East Coast. Among the insects collected and sent to Mr. George Merrill for identification were eight species of scale insects new to Florida, including two species new to science. He spoke of the importance of the insect pests of ornamentals to that portion of the state. In that connection Prof. Watson mentioned the recent finding of a heavy infestation of root-knot on the roots of Washingtonia palms. The roots do not produce the characteristic knot-like galls. Prof. T. H. Hubbell and Prof. John Gray were elected members of the Society.

A. H. BEYER, Sec'y.

TRY NICOTINE SULPHATE

A correspondent writes that his cucumbers are troubled with "yeapus."

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THE CHRYSOMELIDAE OF FLORIDA

By W. S. BLATCHLEY
Dunedin, Florida

To the student of entomology the leaf beetles or Chrysomelidae comprise one of the most interesting families of insects. On account of their variation in form and color they have long been a favorite group of the systematic Coleopterists, while their leaf- and root-feeding habits have for many years attracted the attention of economic entomologists. The family is one of the largest among the Coleoptera, about 18,000 species being known to scientists. Of these Leng, in his recent catalogue, recognizes 974 from America north of Mexico. In the "Coleoptera of Indiana" 265 were included from that State and 20 or more additional ones have since been taken. The present list of 268 species and 15 varieties from Florida shows that the number known from each of these two states is very nearly the same.

The Chrysomelidae may be characterized and separated from our other Coleoptera as follows:

Size medium or small, rarely more than 13 mm. (one-half inch) in length; form variable, usually more or less oval and convex, never much flattened; color variable, often brilliant and shining; surface usually glabrous; antennae rarely more than two-thirds the length of body, filiform, the outer joints rarely subserrate or slightly thickened; front of head small, oblique or inflexed; base of antennae not at all surrounded by the eyes; thorax usually with distinct side margins; tarsi all 5-jointed, but the fourth joint very small and attached very closely to the base of the fifth, the tarsi therefore apparently only 4-jointed; sole usually densely pubescent.

Of the life habits of the great majority of the Chrysomelidae but little or nothing is known, except that the adults occur mainly on the foliage of plants. The larvae of only about 100 species are known, and only those which have proven especially injurious, such as the striped cucumber beetle and the Colorado potato beetle, have been studied in detail from egg to adult. There is therefore a most fertile field for pioneer work by young entomologists along this line.

All the species are diurnal in habit and move slowly over the surface of plants, to which they adhere by means of the dense brushes of hairs upon the under side of the tarsi. The eggs are usually yellowish and elongated and are generally laid upon the leaves or stems of the plants upon which the larvae feed. The latter are of varying form, but for the most part are fleshy convex or chunky hump-backed "slugs" or grubs, a familiar example being that of the Colorado potato beetle. Many of them live on the leaves of the plants, where they feed often in company with the mature insects. Those that live exposed to the light differ from the great majority of coleopterous larvae in being more or less highly colored. Some of them are flattened and curiously armed with spines, while others are partially covered with their own excrement. A few are leaf-miners or stem borers, and these are long and slender and without the conspicuous markings of those which feed in the open. The larvae of one large group are case-bearers; others, including an entire subfamily *(Eumolpinae)* are root-feeders. When ready to transform, many of the leaf-eating larvae fasten themselves by the tail or last abdominal segment to a leaf and enter the chysalis stage, while others go into the ground when about to change to a pupa. The case-bearers pupate within the sealed-up larval case.

The main object of the present paper is to list in natural order the species of Chrysomelidae which in the past have been recorded from Florida, and to show somewhat accurately their distribution in the State. Many of the older Coleopterists, including both Leconte and Horn, were content to put "Fla." or "Florida" after their descriptions, forgetting that the State is approximately 400 miles long, 360 miles wide across its northern border, and contains an area of nearly 60,000 square miles. Representatives of three distinct faunas, the Austroriparian, Subtropical and Tropical, live within its bounds, and the time has come when more definite and accurate distributional notes than those furnished by the mere name of the State are in demand.

Another object is to furnish some knowledge of the principal food plants of each species. But in compiling this data from printed records or from my field accession notes (now more than

10,000 in number) I have been surprised at the paucity of that knowledge. This is due principally to two reasons; First, few of our systematic coleopterists, both past and present, have been active collectors, but have relied largely upon others to furnish their specimens, and neither they nor the collectors kept or recorded ecological data; second, the collecting of beetles in recent years has largely been done by the sweep-net, and this method of capture prevents the food plant being definitely known, unless, as is seldom the case, the vegetation is of a single species. It is only, therefore, of the more common and destructive species that the food plant can be stated with accuracy. The notes, as given after each species, furnish, therefore, information as to the kind of a habitat in which the species may usually be found, rather than accurate knowledge as to its host plant.

The sources of information on which the present paper is based are as follows: *(a)*. My private collection, taken personally, mainly during the months from November to April inclusive, during the past eleven years, and principally in the southern half of the State. In this collection are those species whose serial numbers are preceded by an asterisk (*) numbering 184 of those recorded from the State; *(b)*. The Florida Chrysomelidae in the collection of W. T. Davis, Staten Island, N. Y., which were sent on to me for examination; *(c)*. The collection of the Agricultural Experiment Station at Gainesville, which I have examined in part there, and which in part has been sent to me for identification; *(d)*. The printed records of Florida species as given in the works mentioned in the "List of Works Cited" which follows. A few of these records are open to question as to their proper identification at the time the record was made; *(e)*. Manuscript records, especially those of Schwarz and Hamilton mentioned in the "List of Works Cited," also others kindly sent me by Prof. J. R. Watson, Chas. Schaeffer, H. C. Fall, J. N. Knull, Chas. W. Leng and others.

List of Works Cited in the Present Paper

Arranged Alphabetically by Authors and Years of Publication.

BARBER, H. S.—1916—A Review of North American Tortoise Beetles. Proc. Ent. Soc. Wash., XVIII, 113-127.

BLATCHLEY, W. S.—1902—A List of the Coleoptera taken in the vicinity of Ormond, Florida in March and April, 1899. A Nature Wooing at Ormond by the Sea, pp. 233-238.

1910—An Illustrated Descriptive Catalogue of the Coleoptera known to Occur in Indiana, pp. 1-1386. Chrysomelidae pp. 1095-1233.

1913—On some Apparently New Coleoptera from Indiana and Florida. Can. Ent., XLV, 21-24.

1914—Notes on the Winter and Early Spring Coleoptera of Florida, with Descriptions of New Species. Can. Ent., XLVI, 62-67; 88-92; 140-144; 247-251.

1916—A New Genus and Species of Nitidulini with Descriptions of other New Species of Coleoptera from Indiana and Florida. Can. Ent., XLVIII, 91-96.

1917—On some New or Noteworthy Coleoptera from the West Coast of Florida. Can. Ent., XLIX, 137-143; 236-240; 272-279.

1918—Same, Pt. IV. Can. Ent., L. 52-59.

1919—Some New or Scarce Coleoptera from Western and Southern Florida.—III. Can. Ent., LI, 65-69.

1920—Notes on the Winter Coleoptera of Western and Southern Florida with Descriptions of New Species. Can. Ent., LII, 42-46; 68-72.

1920a—Notes on some Coleoptera taken in the vicinity of Dunedin, Florida in the Spring of 1920, with Descriptions of New Species. Can. Ent., LII, 259-264.

1921—Notes on Indiana Halticini with Characterization of a New Genus and Descriptions of New Species. Journ. N. Y. Ent. Soc., XXIX, 16-27.

1922—Some New and Rare Coleoptera from Southwestern Florida. Can. Ent., LIV, 9-14; 27-33.

1923—Notes on the Coleoptera of Southern Florida with Descriptions of New Species. Can. Ent., LV, 13-20; 30-36.

1924—New Coleoptera from Southern Florida with Notes on Other Interesting Species. Can. Ent., LVI.

BOWDITCH, F. C.—1909—Notes on Pachybrachys and Descriptions of New Species. Can. Ent., XLI, 237-244; 285-292; 312-324.

CASTLE & LAURENT—1896-'97—April Collecting in Georgia and Florida. Ent. News, VII, 300-305; XIII, 7-9.

CROTCH, G. R.—1873—Materials for the Study of the Phytophaga of the United States. Proc. Acad. Nat. Scie., Phil., XXV, 19-83.

DOZIER, H. L.—1918—An Annotated List of Gainesville, Florida Coleoptera. Ent. News, XXIX, 295-298; 331-335; 370-374.

FALL, H. C.—1910—Miscellaneous Notes and Descriptions of North American Coleoptera. Trans. Amer. Ent. Soc., XXXVI, 89-197.

1915—A Revision of the North American Species of Pachybrachys. Trans. Amer. Ent. Soc., XLI, 291-486.

HAMILTON, DR. JOHN—1888—A Manuscript List of Coleoptera taken in the vicinity of St. Augustine, Florida by Mr. Chas. Johnson.[1]

1894—Coleoptera taken at Lake Worth, Florida. Can. Ent., XXVI, 250-256; XXVII, 317-322.

HORN, G. H.—1883—Miscellaneous Notes and Short Studies of North American Coleoptera. Trans. Amer. Ent. Soc., X, 269-312.

1889—A Synopsis of the Halticini of Boreal America. Trans. Amer. Ent. Soc., XVI, 163-320.

[1]See Schwarz, Proc. Wash. Entom. Soc., No. 3, 1889. All St. Augustine records by Hamilton refer to his list.

1892—The Eumolpini of Boreal America. Trans. Amer. Ent. Soc., XIX, 195-234.

1893—The Galerucini of Boreal America. Trans. Amer. Ent. Soc., XX, 57-136.

LECONTE, J. L.—1878*—New Species of Coleoptera from Florida. Proc. Amer. Phil. Soc., XVII, 373-434.

1880—Short Studies of North American Coleoptera. Trans. Amer. Ent. Soc., VIII, 163-218.

LENG, C. W.—1891—Review of the Donacia of Boreal America. Trans. Amer. Ent. Soc., XVIII, 159-176.

1920—Catalogue of the Coleoptera of America North of Mexico, pp. 1-470.

SCHAEFFER, CHAS.—1919—Synonymical and other Notes on some Species of the Family Chrysomelidae and Descriptions of New Species. Journ. N. Y. Entom. Soc., XXVII, 307-343.

SCHWARZ, E. A.—1878*—Descriptions of New Species of Coleoptera from Florida. Proc. Amer. Phil. Soc., XVII, 354-372.

1878*—List of Species of Coleoptera from Florida. Proc. Amer. Phil. Soc., XVII, 434-472.[2]

SCHWARZ, E. A.—Ms.—A manuscript list of all additions to his "Coleoptera of Florida," up to about 1910. This List is in the Smithsonian Library.[3]

SLOSSON, MRS. A. T.—1893—Spring Collecting in Northern Florida. Journ. N. Y. Ent. Soc., I, 147-152.

1895—Coleoptera of Lake Worth, Florida. Can. Ent., XXVII, 9-10.

WICKHAM, H. F.—1909—A List of the Van Duzee Collection of Florida Beetles. Bull. Buffalo Soc. Natural Sciences, IX, 399-405.

In the list of species which follows, the sequence and the nomenclature, with rare exceptions, is that of Leng's "Catalogue of the Coleoptera of America North of Mexico," and the number in parenthesis before each species is that of said catalogue. Where a species was originally described from Florida the date of year and page follows the name of author, the name of the publication in which the description appeared being given after the date of that year in the "List of Works Cited."

The names of authors whose locality records are mentioned or of those who furnished manuscript data are, to save space, usually abbreviated as follows:

Barber, H. S.=Br.	Leconte, J. L.=Lec.
Blatchley, W. S.=Bl. or Blatch.	Schaeffer, Chas.=Schf.
Castle & Laurent=C. & L.	Slosson, Mrs. A. T.=Sl.
Davis, W. T.=Dav.	Schwarz, E. A.=Sz.
Dozier, H. L.=Doz.	Watson, J. R.=Wat.
Knull, J. N.=Kn.	Wickham, H. L.=Wic.

[2]The three papers marked with an asterisk comprise the work of Schwarz entitled "The Coleoptera of Florida." Since the Leconte article is included I have thought it best to list the three separately

[3]See Can. Ent., L, 1918, 419.

By our later systematists the family Chrysomelidae is separated into 15 groups or subfamilies, 12 of which are represented in Florida. Each of these is mentioned under the brief characterization of its first genus in the list which follows.

LIST OF SPECIES AND VARIETIES

I. Donacia Fabricius.

Elongate or oblong graceful beetles of medium size (6-12 mm.), occurring upon the foliage and flowers of water-lilies, pickerel-weed, skunk cabbage, arrow-head and other semi-aquatic plants; the larvae living under water and feeding upon the roots, the adults flying actively about and mating usually within the flowers. They have the head constricted to form a neck behind the eyes, thorax narrower than elytra and without side margins; mandibles simple; first ventral about as long as the others united. (Subfamily *Donacinae.*)

1. (15197). **D. floridae** Leng, 1891, 196.—Types in the U. S. N. Mus. from Enterprise. No other Florida record. Food plant white water-lily, *Castalia odorata* (Dryand). The males differ from those of all others in having the hind femora much surpassing the tips of elytra.

2. (15198a). **D. cincticornis** Newn.—Crescent City (Sz. Ms.). "Jupiter and Lake Worth; not a var. of *proxima* but a distinct species" (Schf. Ms.).—White water-lily; yellow water-lily, *Nymphaea advena* Sol.; pondweed, *Potamogeton.*

3. (15200). **D. hypoleuca** Lac.—Enterprise, Lake Poinsett, Crescent City (Sz. Ms.). Lake City (Wat.). Schaeffer (Ms.) says that the Crescent City specimens in the U. S. N. Mus. are *texana.*

4. (..........). **D. texana** Crotch.—"Crescent City; a distinct species, not the female of *hypoleuca* as stated by Leng." (Schf. Ms.).—Yellow water-lily.

*5. (15202). **D. piscatrix** Lac.—Throughout the State. Common about Dunedin, Mch.-Apr., mating in flowers of its only food plant, the yellow water-lily.

6. (15206). **D. rugosa** Lec., 1878, 415.—Described from Enterprise. Crescent City (Sz. Ms.).—Pickerel-weed, *Pontederia cordata* L.

7. (15212). **D. torosa** Lec.—"Specimens in Leng Collection labelled 'Fla.'; occurs in Massachusetts on *Carex* and grasses in moist meadows" (Schf. Ms.).

8. (15215). **D. metallica** Ahr.—"Specimens in Leng Collection labelled 'Fla.'" (Schf. Ms.). In Indiana this species has been taken only between

the bases of the leaves of skunk cabbage, *Spathyema foetida* (L.); in Massachusetts on the tussock sedge, *Carex stricta* Lam.

II. Lema Fabricius.

Oblong, often prettily variagated beetles of small size (4-7 mm.) occurring usually on herbage in dense woodland or moist places. Head with a neck behind eyes; elytral punctures in rows; thorax constricted at middle; tarsal claws simple. The larvae feed on foliage and, for protection, cover their backs with their own excrement. (Subfamily *Criocerinae.)*

*9. (15236). **L. cornuta** Fabr.—Numerous records from the northern half of the State. Taken by me at Lake Wales, Marco and Dunedin, Mch.-Apr., while sweeping natal grass and other herbage. Miami (Kn.).

10. (15238). **L. texana** Cr.—Suwannee Springs; on flowers of the butterfly-pea, *Clitoria mariana* L. (Sl., 1893). The only definite State record.

*11. (15239). **L. brunnicollis** Lac.—Fernandina and St. Augustine on *Carduus* (Sz.). Common at Sarasota and Sanford, Febr.-Mch., on flowers of a thistle, *Carduus spinosissimus* Walt. (Bl., 1913). L. Wales and Gainesville; common, June-Sept., on live oak (Wat.).

12. (15242). **L. maculicollis** Lac.—L. Ashley and Haw Creek (Sz.). Cleveland (Kn.).

13. (15243). **L. collaris** Say.—Enterprise (C. & L.). The only State record.—In Indiana the food plant is the spiderwort, *Tradescantia virginiana* L.

*14. (15246). **L. solani** Fabr.—Throughout the State. Occurs mainly in March and April on the black nightshade, *Solanum nigrum* L., and allied plants.

15. (15248). **L. circumvittata** Clark.—Listed as *L. conjuncta* Lac. from Enterprise (Sz.); afterwards (Ms.) from St. Augustine and Crescent City, and changed to *circumvittata.* L. Worth (Ham.); Clearwater (Wic.).

16. (15250). **L. conjuncta** Lac.—L. Worth (Ham.). Gainesville, swept from oak, Apr. 1 (Doz.). Perhaps confused with *circumvittata,* as not mentioned from Florida in Leng Catalogue.

17. (15251). **L. confusa** Chev.—Crescent City (Sz. Ms.); Enterprise, Apr. 16 (C. & L.). Biscayne Bay (Schf. 1919.).

*18. (15253). **L. trilineata** (Oliv.).—Throughout the State. Abundant at Gainesville, April, on ground cherry (Doz.). Rare at Dunedin. Food plants, potato, night-shade, horse-nettle and other Solanaceae.

*19. (15256a). **L. sexpunctata albina** Lac.—Enterprise (C. & L.); Crescent City (Sz. Ms.); Sanford, Apr. 4 (Bl.); Gainesville on dog-fennel, Aug. 4 (Wat.); Ft. Myers (Wic.). Cleveland (Kn.).

*19a. (15256b). **L. sexpunctata ephippium** Lac.—Crescent City (Sz. Ms.); Ormond, Apr. 4 on blossoms of thistle (Bl., 1902); Sanford, Apr. (Bl.); Gainesville on basswood, June (Wat.).

(To be continued)

The

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THE SCIENTIST

The following from the Cincinnati Commercial Tribune, published during the meeting of the American Association for the Advancement of Science in that city, is so good, and incidentally, so comforting to our conceit, that we reproduce it here for the benefiit of our readers:

"Popularly speaking, the scientist is to society in general a something apart. We know he is there busy on the inside with laboratory experiment and busy on the outside with labored research in investigation. We regard him highly, respect him sincerely and forget him entirely until some wonder work of development or discovery brings some one of him into the limelight of public attention.

"Now this is not unflattering to the scientist, but on the contrary is wholly complimentary. We recognize him as our guide, philosopher and friend blazing the way to knowledge, but some planes removed from us in the average of the upward climb toward achievement. Except the fundamentalists whose dogma he may disturb, we accept him at his word and take what he teaches us as the latest in that particular line. In the fields of utility we grant him the halo of a benefactor of his race. We recognize him as the giver of good gifts in adding constantly to the interest and comfort, even the exhilaration and luxuriousness of life."

THE CINCINNATI MEETING OF THE A. A. A. S.

The Association meetings extended from Dec. 27 to Jan. 2. Among the affiliated societies meeting with the Association at which papers on entomology were read were the Entomological Society of America, the Am. Ass. of Economic Entomologists, and the Ecological Society of America.

In his address, "A Retrospect", the retiring president of the Association, Prof. J. Playfair McMurrick, reviewed the progress that has been made in the Association and in science in general since the organization of the Association seventy-five years ago. He spoke especially of the revolutionary influence of the doctrine of evolution upon science in particular and human thought in general. In conclusion he stated: "No, evolution is not dead, nor can it be killed by legislative enactment."

In the public address of the Entomological Society Dr. James G. Needham spoke on "The Role of Insects in Food Production". He drew attention to the practicability of using insects as food for other animals, especially fishes and birds. While most farmers are spending their good money for insecticides to kill insects Dr. Needham is raising them as a forage crop.

Among the papers presented before the Ecologists was one on the use of calcium cyanide in exterminating burrowing rodents. This substance should be effective against our "salamanders" and possibly "gophers".

In the meeting of the Economic Entomologists the Japanese Beetle and the European Corn Borer received much attention as did also the use of oil emulsions instead of lime-sulphur for the control of the San Jose scale. The following members of our own societey were elected to membership in the association: Reginald Hart, Donald Reese, and F. G. Tooke. H. L. Dozier was elected to active membership. A. F. Burgess was elected president.

Our members present at the meeting were Geo. Ainsley, E. W. Berger, Dr. H. S. Davis (Washington, D. C.), H. L. Dozier (and his newly acquired wife), H. C. Goodwin, Herbert Osborn, Donald Reese and J. R. Watson.

RECENT PUBLICATIONS ON FLORIDA INSECTS

Three bulletins and articles recently published by our members are: "Bordeaux-oil Emulsion"—Winston, Bowman, and Yothers. U. S. D. A. Departmental Bulletin 1178.

"Striped Sod Worm, *Crambus mutabilis* Clemens"—Geo. G. Ainslie. Jl. Ag. Research Vol. XXIV, No. 5.

"Synopsis and Catalog of the Thysanoptera of North America (with a translation of Karny's Keys to the Genera of Thysanoptera and a Bibliography of Recent Publications)"—J. R. Watson. Univ. of Fla. Ag. Exp. Station, Bull. 168.

We also note, "The Puss Caterpillar and the Effects of its Sting on Man"—F. C. Bishop. U. S. D. A. Departmental Circular 288.

In the Jl. of Agric. Research Vol. XXV, No. 5, Mr. A. C. Baker describes a new and possibly dangerous whitefly *(Aleurodicus manni)* from Honduras.

NOTES ON FLORIDA LEPIDOPTERA

D. MARSTON BATES

(Contribution from the Department of Entomology, Fla. Agr. Exp. Sta.)

Papilio polydamas L.

Grossbeck, in his Lepidoptera of Florida, gives only the indefinite locality "Indian River" for this species. It is, however, locally quite abundant in southeast Florida, and I have found it in both the adult and larval stages at Stuart, Palm Beach, Ft. Lauderdale, and Miami. The larva is at times destructively abundant on *Aristolochia.*

Papilio troilus form **iloneus** A. & S. (=*texanus* Ehr.)

Larvae of this species that were collected on camphor have been sent in to the Experiment Station on several occasions.

Anartia jatrophae L.

Holland (1898) erroneously states that the early stages of this genus and species are unknown, and apparently all who have followed him have fallen into the same error. Scudder, Proceedings of the American Academy of Arts and Sciences, 1892, p. 239, gives the following note on the larva: "Black, the front of the first thoracic segment, the prolegs, and the base of many of the spines more or less ochraceous. *Chrysalis:* Smooth and wholly black, except the borders of the antennal cases and the stigmatal fissures, which are whitish, and the cremaster is somewhat ochraceous at base. Food-plant, Lippia."

Seitz, Macrolepidoptera, Vol. V, cities *Jatropha manihot* as the food-plant.

Very abundant in south Florida at times, especially in the Everglades, along the banks of the canals.

Victorina steneles L.

This is another one of the many species, the early stages of which Holland erroneously states to be unknown. Scudder, op. cit., p. 238, gives the following note on the early stages of this species: "*Mature Caterpillar:* Coronal spines of head 8 mm. long, red, broadly crimson at base, whitish in the middle and brownish at tip. Body velvety black, the spines reddish gray, a mediodorsal stripe of stiff pile, less abundant than the unequal papilla-seated pile on the sides. Feeds on *Blechum.*"

Seitz, Macrolepidoptera, vol. V, p. 464 states that the life-history of *V. trayja* only is known, and that the food-plant is *Acanthaceae.*

Diaethria clymena Cramer

Early stages stated by Holland to be unknown. Described by Scudder *(op. cit.)*, who states that the food-plant in Brazil is *Trema micrantha.* Another species of the genus, *Trema floridana* Britton is found in peninsular Florida and on the keys (Small), and is possibly the food-plant in Florida.

Athena peleus Sulz.

Scudder has given some notes on the early stages of this species in his above mentioned paper. I have frequently reared it at Ft. Lauderdale on *Ficus carica,* the cultivated fig. Scudder states that the food-plants are *Ficus* and *Anacardium.* Seitz states that the larva occurs on "Cachou" *(Anacardium).*

The butterfly is quite common in the "hammocks" of southeast Florida, where the *Ficus* species are found.

MEETINGS OF THE FLORIDA ENTOMOLOGICAL SOCIETY

December 7, 1923. A regular meeting was held in Language Hall, Pres. G. B. Merrill in the chair. Members present: Rogers, Berger, Watson, Gray, Hubbell, Major Floyd, Bates, Walker, Merrill, O'Byrne, Stirling, and Beyer. Dr. F. Thome was a visitor.

The address of the meeting was a very interesting narrative by Mr. Hubbell on a collecting trip to Honduras. Prof. Hubbell visited Honduras in the spring of 1923 with an expedition of entomologists and pathologists in charge of Dr. Johnson. The object of the expedition was to investigate insects which are a source of great loss in the banana plantations of the United Fruit Co. Because of the ravages of the Panama blight disease in the older plantations the company is obliged to constantly seek new banana lands and are constantly pushing their plantations up the valleys towards the dry interior.

Most of the collecting done by the speaker was along the Tela and Truxillo divisions of the company's railroad, but a trip was made over the mountains into the more arid interior. Here the fauna was quite different from that of the banana country. Dr. Hubbell found the orthoptera of the region especially interesting. Ticks were very abundant and troublesome. He spoke of the very interesting ants which inhabit the thorns of the *Acacia* trees.

In the humid coastal section many of the insects were specialized for arboreal life. Gorgeous butterflies were very abundant, as were also snakes. Mimicry was common. Dr. Hubbell did some collecting about lights at night thereby catching many valuable specimens that otherwise would have been missed.

He described the culture of bananas. Paths are cut thru the jungle and the banana slips planted. The entire forest is then cut and, when sufficiently dry, burned. The banana shoots immediately spring up and have a start of the other vegetation. Practically no cultivation is given except to cut down the brush and old banana stalks.

January 18, 1924. The regular meeting of the Florida Entomological Society was held in Language Hall, the president, Geo. B. Merrill, in the chair. The following members were present: Bates, Berger, Beyer, O'Byrne, Merrill, Montgomery, Walker, Watson.

Meeting opened with the election of officers. All former officers were reelected.

The program of the evening included reports from several members who were in attendance at the Cincinnati and Birmingham meetings. The first speaker, Dr. E. W. Berger, reported that the A. A. A. S. meetings at Cincinnati were well attended. He gave a brief account of Dr. Hamlin's address on the biological control of cactus as illustrated by Australia's struggle to control the prickly pear cacti which overrun the entire country, by means of introducing insects and diseases. Great difficulty in introducing any control measures is experienced because of the fact that the government owns the land and leases it for periods of years to individuals, who as a consequence, have little interest in improving it.

Professor J. R. Watson spoke of attending three meetings, the Entomological Society of America, the American Association of Economic Entomologists, and the Ecological Society of America. He also reported an interesting conference on the Mexican bean beetle. This beetle is characteristic of mountainous regions and apparently need not be feared in the coastal plain.

The meetings of the Association of Southern Agricultural Workers at Birmingham, Alabama, were discussed by Dr. Montgomery, who reported an address by Dr. Hull of Mississippi, who spoke of cotton production as a matter of fundamental importance, and told of the committee which was appointed to secure all possible information on cotton production and boll weevil control. B. R. Coad, of the Bureau of Entomology, U. S. D. A., gave an interesting address on boll weevil experiments. The net results of experiments at Tullulah, La., were given by means of charts, showing the saving in dollars per acre by the use of different methods of control. In the absence of Mr. George B. Smith, Dr. Newell was called on and gave a brief report on the results of the Florida Method for 1923. It was recommended by the committee that on the poor, low-yielding soils of the Coastal Plain the Florida Method be used, and in the rich delta regions the dusting method be used, as under the wide range of conditions no one method can be successfully applied.

The treatment of cotton plants just before formation of squares was recommended. The treatment ordinarily would be applied about May 20th and would consist in applying by means of a mop a calcium arsenate syrup mixture.

A new method of boll weevil control was demonstrated with the Barber machine, composed of a burner and copper coils, using a mixture of steam and kerosene vapor to destroy the weevils.

A. H. BEYER,
Secretary.

Dr. W. S. Blatchley expects to leave Dunedin about March 10 on a collecting trip to Miami and the Royal Palm Park. He is working on the heteroptera.

THEY CERTAINLY ACT THAT WAY

"Kindly give me the latest dope on the leaf-hopper or jazzid."
—A correspondent.

The
Florida Entomologist
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VOL. VII SPRING NUMBER No. 4
April, 1924

THE CHRYSOMELIDAE OF FLORIDA

By W. S. Blatchley
Dunedin, Florida

(Continued from Vol. VII, No. 3)

III. **Antipus** DeGeer=(**Anomœa** Lac.)

Rather stout elongate (7-8 mm.) subcylindrical, dull yellow species having the head inserted in thorax to eyes; thorax as wide as elytra and with side margins; mandibles toothed; last dorsal segment exposed, declivent; antennae short, serrate, not received in grooves; surface not tuberculate; prosternum not separating front coxae. The larvae are case-bearers and are said to live mainly in ants' nests, feeding upon vegetable debris. (This and Genus IV form the subfamily *Clythrinae.)*

*20. (15262). **A. laticlavia** (Forst.).—Numerous records from the northern three-fourths of the State. Dunedin at porch light, Apr. 26. Occurs on oak, citrus, etc.; "feeding on pine foliage, June 8" (Doz.). Also said to injure leaves of cotton.

IV. **Coscinoptera** Lacordaire.

Small oblong (3-7 mm.) black pubescent species. The eggs are attached to leaves of various plants. The larvae are case-bearers, and feed upon dead leaves of the plants upon which the adults are found. (Riley, Ins. Mo., VI, 127.)

*21. (15267). C. **dominicana** (Fabr).—Haulover and Tampa, very rare (Sz.). Dunedin, one only, Apr. 5; Gainesville on oak (Doz.).

V. **Chlamys** Knoch.

Small robust blackish or bronze beetles (2-4 mm.) having the upper surface furnished with numerous wart-like tubercles, and antennae received in grooves. The larvae live on the surface of leaves enclosed in cases formed of their own excrement. This genus and the next are very closely allied forming the subfamily *Chlamydinae* which is badly in need of revision.

*22. (15297). **C. gibbosa** (Fabr.).—Common throughout the State. Usually listed as *C. plicata* (Fabr.). Common about Dunedin on roadside herbage. On chinquepin blooms, evidently eating the pollen, at Gainesville, May 20 (Doz.).

*23. (15298). **C. tuberculata** Klug.—Enterprise (Sz. Ms.); Sanford, La Belle, Istokpoga and Dunedin (Bl.); frequent about Dunedin, Dec.-Apr., on flowers and foliage of a dwarf huckleberry. Ft. Myers (Kn.).

24. (15300). C. **foveolata** Knoch.—Tampa, rare (Sz.); Key West (Sz. Ms.).

VI. **Exema** Lacordaire.

Resemble *Chlamys* but smaller (1.8-2.7 mm.); the males usually with face white. Habits of larvae the same.

*25. (15305). **E. gibber** (Oliv.)—Common throughout the State. Occurs during the winter on the foliage of oak, huckleberry, etc. Dimorphic in hue, the typical form opaque black. My *Chlamys nodulosa* (1913, 22), based on the bronzed form, is a synonym.

*26. (15306). **E. conspersa** (Mann.).—Taken in some numbers about Dunedin by sweeping low moist cultivated tracts about the borders of hammocks (Bl., 1920). No other record from the State, but a specimen in the U. S. N. Mus. from Enterprise.

*27. (——). **E. neglecta** Blatch, 1920, 69,—Common throughout the southern half of the State; probably also in the northern portion. Frequents the foliage and flowers of huckleberry and other low shrubs during the winter and spring months. Usually listed as *E. conspersa.*

VII. **Griburius** Haldeman.

Small oblong robust yellow species (5-6 mm.), the elytra and sometimes the thorax with black dots. Habits of larvae not known. The species of this and the genera up to XIV possess the characters mentioned under *Antipus* except that the antennae are usually long and slender, and the prosternum separates the front coxae. They belong to the subfamily *Cryptocephalinae.*

*28. (15307). **G. larvatus** (Newn.)—Throughout the State. Taken frequently in spring about Dunedin by sweeping low herbage. Miami, LaBelle, Cleveland and Paradise Key (Kn.).

VIII. **Pachybrachys** Redtenbacher.

A large genus of small compact subcylindrical species (2.5-5.5 mm.), varying much in color, from gray or yellow to black, or red with black markings. Fall in his Revision (1915) includes 159 species from North America. Of these 26 have been definitely recorded, some of them doubtless erroneously, from Florida. A number of the other species, known as yet only from Georgia or Alabama, probably occur in the northern part of the State. But little is known of the food habits of the larvæ. Schwarz wrote Fall that they "are unquestionably all sac-bearers, but are difficult to find and do not feed upon the foliage of plants."

29. (15312). **P. pubescens** (Oliv.)—St. Augustine (Ham.) as *P. morosus* Hald., a synonym. Fall gives South Carolina as the most southern range known to him.

*30. (15337). **P. lodingi** Bowd., 1909, 243.—Fall (1915) records this from seven different stations, including Jacksonville and Key West, so that it doubtless occurs throughout the State. Taken frequently about Dunedin, Nov.-Apr., by sweeping herbage in dry sandy localities.

31. (15358). **P. sobrinus** Hald.—Enterprise, rare (Sz.). No other State record. Fall does not include Florida in his distributional records, though *pectoralis* Melsh., a very closely allied species, is recorded by him from both Georgia and Alabama. Occurs on black locust in Missouri (Riley).

32. (15365). **P. illectus** Fall, 1915, 370.—The types, now in the U.S.N. Mus., were taken at Enterprise, May 20. No other record.

33. (15369). **P. femoratus** (Oliv.)—Enterprise and Key West (Fall, 1915). Occurs on hickory and oak in Alabama.

*34. (15370). **P. characteristicus** Suffr., 1853, 176.—Known only from Florida. Seven localities, including Key West and Jacksonville, are given by Fall. In addition to these I have it from Sanford, Gainesville and Dunedin. Taken by beating in dense wet hammocks.

35. (15393). **P. peccans** Suffr.—"Duval Co., Leng Coll." (Fall 1915). No other State record. On *Prunus* and *Rumex* in the north.

*36. (15407). **P. atomarius** (Melsh.).—Throughout the State. Rare at Dunedin, Apr. 3, by sweeping low huckleberry.

*37. (15410). **P. stygicus** Fall, 1915, 417.—The type is from Enterprise and Fall gives six other localities, including Jacksonville and Key West. At hand from Sanford, Dunedin and Gainesville. Frequent about Dunedin, Jan.-Apr., on the flowers and foliage of dwarf huckleberry, etc. One of the few wholly black species occurring in the State.

38. (15413). **P. roboris** Fall.—Jacksonville; Ashmead Coll., U. S. N. Mus. (Fall). No other State record.

*39. (15414). **P. spumarius** Suffr.—In my collection from Ormond, Sanford, Palmdale, Gulfport and Dunedin. Identified by Fall. Merritt and Ft. Pierce on Oak (Wat.). The most common *Pachybrachys* about Dunedin, Dec.-Apr., on the foliage and flowers of low huckleberry and other herbage, especially that about the borders of wet hammocks. Not before recorded from the state.

*40. (15418). **P. varians** Bowd.—Fall records this from six stations, Jacksonville and Key West included. I have it from Eustis, Ocala, L. Wales, Lakeland and Dunedin, Oct. 31-Apr. 15. Scarce about Dunedin, on natal grass and low herbage in dry soil.

41. (15419). **P. conformis** Suffr., 1853, 205.—Tampa and Enterprise (Fall). Known only from Florida.

42. (15420). **P. osceola** Fall, 1915, 428.—Types in U. S. N. Mus. from Enterprise. No other record.

43. (15432). **P. tridens** (Melsh.)—Enterprise, Lake Ashley and Tampa (Sz.). Not included from Florida by Fall. Schwarz informed Fall that this was the only eastern species, the imago of which has a definite known food plant, the plant being the poison ivy, *Rhus toxicodendron* L.

44. (15433). **P. obsoletus** Suffr.—One in Liebeck coll. from Florida (Fall). No other State record. On black locust in Missouri (Riley).

*45. (15444). **P. litigiosus** Suffr.—Throughout the State. At hand from Jacksonville, Gainesville, Ft. Myers and Dunedin. Common about Dunedin, Nov.-Apr., on a wild bean along the railway embankment and on herbage which has sprung up on recently burned-over tracts.

46. (15450). **P. pallidipennis** Suffr.—"Tampa, common" (Sz.). No other State record. Known elsewhere only from Kansas and Texas.

47. (15451). **P. othonus** (Say).—Key West, Leng Coll. (Fall). Orlando (Kn.).

48. (15455). **P. carbonarius** Hald.—New Smyrna and Tampa (Sz.); St. Augustine (Ham.); Jacksonville (C. & L.); Sanford (Wic.). In Indiana occurs on oak and roadside herbage.

49. (15457). **P. viduatus** (Fabr.).—Florida, Leng Coll. (Fall). Gainesville (Wat.).

50. (15459). **P. trinotatus** (Melsh.).—"Not rare" (Sz.); Enterprise (C. & L.); Crescent City and Estero (Wic.). These records should perhaps refer to *pulvinatus*. In Indiana occurs on flowers of Jersey tea, *Ceanothus americanus* L.

*51. (15460). **P. pulvinatus** Suffr.—Capron, Baldwin, Enterprise, Tampa and Key West (Fall). Scarce about Dunedin in March on tall grass along the margins of ponds and moist hammocks. Closely resembles *trinotatus* but the legs with small yellow spots, instead of wholly black as there.

52. (15462). **P. luridus** (Fabr.)—Jacksonville and Key West (Fall). In Indiana occurs on the flowers of Jersey tea and false indigo, *Baptisia leucantha* T. & G.

*53. (15466). **P. discoideus** Bowd., 1909, 239.—Type from Port Orange. Occurs throughout the State. Formerly known as *limbatus* Newn., a preoccupied name. At hand from Ormond, Ocala, Palmdale and Dunedin. Frequent at Ormond and Dunedin in spring on oak and huckleberry. The dull red elytra with abbreviated broad black sutural stripe easily distinguish the species.

*54. (15470). **P. hepaticus** (Melsh.).—Cedar Keys, New Smyrna and Tampa (Sz.); St. Augustine (Ham.); Jacksonville (Fall). Scarce at Dunedin, Feb.-Apr., on ground beneath boards and by sweeping.

IX. **Monachulus** Leng.

Small compact, dark blue or black species (2-3 mm.). Larvæ unknown. The old name, *Monachus* Suffr., was preoccupied.

55. (15472). **M. ater** (Hald.).—Enterprise (C. & L.). No other State record. Occurs in Indiana on milkweed.

*56. (15473). **M. saponatus** (Fabr.).—Throughout the State. At hand from Sanford, Ft. Myers and Dunedin, Dec.-Apr. Occurs on herbage in moist places, mating Dec. 9.

*57. (15474). **M. thoracicus** (Cr.), 1873, 31.—Types from South Carolina and Florida. Throughout the northern three-fourths of the State. Abundant at Gainesville, Feb. 18-Mch. 8, on wild plum, cherry-laurel and wild cherry blossoms (Doz.).

*58. (15475). **M. auritus** (Hald.).—Throughout the State. At hand from six different stations, Febr.-Apr. Beaten from oak and wax myrtle. *Cerothamnus ceriferus* L.

X. **Cryptocephalus** Geoffroy.

Small compact oblong subcylindrical species (3-6.5 mm.), usually prettily striped or spotted, and found on foliage of trees or shrubs. Food habits of larvae unknown or unrecorded. The genus is a large one and needs revision badly, 44 species being recognized by Leng, 21 of which are known from Florida.

59. (15479 a). C. **notatus quadrimaculatus** Say.—"Fla." (Leng Coll.). No definite locality record can be found. Frequent in Indiana on flowers of Jersey tea.

*59a. (15479b). C. **notatus fulvipennis** Hald.—Northern three-fourths of the State. At hand from Ocala and Dunedin, Oct.-Apr. Scarce at Dunedin on oak. Gainesville on wild cherry bloom, March 9; oak and wild buckeye foliage, Apr. 3-18 (Doz.). La Belle, Apr. (Kn.).

*60. (——). C. **binominis** Newn.—Northern three-fourths of the State. At hand from Ormond, Istopoga, L. Okeechobee and Dunedin, Mch.-Apr. On oak and low huckleberry. Leng erroneously places this as a synonym of *Bassareus detritus* (Oliv.) (See Bl., 1923, 30.). The *C. distinctus* Hald. (Sz.) belongs here (Sz. Ms.).

*61. (15483). C. **guttulatus** Oliv.—Recorded or reported from six stations as far south as Sanford. Ormond, Apr. 1, on oak (Bl., 1902).

*62. (15486). C. **bivius** Newn.—Occurs as far south as Estero (Wic.). Scarce at Ormond, Eustis, Sanford and Dunedin, Mch.-Apr., on oak and huckleberry.

*63. (15491). C. **defectus** Lec.—According to Schaeffer (Ms.) my *C. sanfordi* (1913, 23) is a synonym of *defectus*. The latter is recorded only from Texas. My specimens of *sanfordi* are from Sanford, Istokpoga and Dunedin, Mch. 25-31 ,and were beaten from willow. Schaeffer also suggests that *defectus* Lec. is probably a color variety of *nanus* Fabr., the two differing only in color of elytra.

64. (15493). C. **confluens** Say.—"Florida" (Schaupp[4]). The only State record.

65. (15495). C. **venustus** Fabr.—"Common" (Sz.). No other printed record. St. Augustine (Ham.). Gainesville, Jan.-Aug.; Largo (Wat.).

65a. (15495c). C. **venustus ornatulus** Clav., 1913, 1914. "Florida." No other record.

*66. (15496). C. **obsoletus** Germ.—Throughout the State from Paradise Key and Estero northward. At hand from six stations, Dec.-Apr. Taken from flowers of golden-rod and other Compositae. The *C. ornatus* Fabr. of the Schwarz list is a synonym (Sz. Ms.).

———

[4] Bull. Brook. Ent. Soc., I, 1878, 34.

*67. (15497). C. **nanus** Fabr.—"Ark. and Fla.," (Lec., 1880). Jacksonville (C. & L.). Dunedin (Bl., 1917). A half dozen specimens have been taken at Dunedin, Feb.-Apr., all while beating in a densely wooded wet hammock.

*68. (15500). C. **calidus** Suffr.—Dunedin (Bl., 1917, 1922), Dec.-Jan., scarce on huckleberry and other low shrubs. LaGrange, Sept. 11 (Davis coll.).

*69. (——). C. **albicans** Hald.—Gulfport, Schaeffer Coll.; Lakeland, May 5, Davis Coll. (Bl., 1923). Leng places this as a synonym of *gibbicollis* Hald., but Schaeffer considers them distinct.

*70. (15502). C. **aulicus** Hald.—Occurs from St. Augustine (Ham.) south to Estero (Wic.). Dunedin (Bl., 1920a, 1923), scarce, Nov.-Apr., on low vegetation along the edge of a hammock. The largest (6-6.5 mm.) of the Florida species.

*71. (15503). C. **trivittatus** Oliv.—St. Petersburg (Wic.); Bradentown (Watson) Aug. 12, sweeping herbage in a vacant lot (Bl., 1923).

*72 (15505). C. **incertus** Oliv.—Jacksonville, Sept. 7 (Davis Coll.) south to LaBelle; numerous records. The most common species about Dunedin, Nov.-Apr., on wax myrtle, huckleberry, and especially the fetter-bush, *Pieris nitida* (Bart.).

*73. (15506). C. **pumilus** Hald.— Common throughout the State, Nov.-May, on willow and dead vines along streams; at Cape Sable, sweeping in open prairie. The smallest member (1.8-2.2 mm.) of the genus.

74. (15514). C. **badius** Suffr.—"Enterprise, not rare." (Sz.); Crescent City (Sz. Ms.). Cleveland (Kn.). Gainesville, in numbers on linden, July 12-14 (Doz.).

75. (15515). C. **schreibersi** Suffr.—Tallahassee (Sz. Ms.); Jacksonville, Apr. 21 (C. & L.). Schaeffer (Ms.) doubts its occurrence in Florida, though Leconte (1880) records it from Georgia. Food plant, pine.

*76. (15516). C. **tinctus** Lec.—Ft. Capron (Sz. Ms.). Lakeland, Istokpoga, Dunedin, Dec.-Feb. (Bl., 1914). Scarce on low herbage along the borders of lakes and in wet hammocks; hibernating in Spanish moss at Lakeland.

*77. (15517). C. **lateritius** Newn.—Crescent City (Sz. Ms.); Lakeland and Dunedin, Nov.-Mch. Occurs mainly on the flowers and foliage of a tall, scurfy Ericad shrub, *Xolisma ferruginea* Walt., growing in very dry sandy soil.

78. (15519). C. **luteolus** Newn., 1840, 250.—Described from Florida. Jacksonville, Apr. 21 (C. & L.).

XI. **Diachus** Leconte.

Very small (1.5-2.5 mm.) subcylindrical oval species, usually with a metallic greenish or bronzed surface. Larvæ unknown.

*79. (15521.) D. **auratus** Fabr.—Throughout the State. At hand from Sanford, Lakeland, Ft. Myers and Dunedin, Feb.-Apr.; frequent on dwarf huckleberry in open pine woods. Gainesville, May-Oct. (Wat.).

*80. (15525). D. **squalens** Suffr., 1852, 73.—Described from Florida. Haulover and Ft. Capron (Sz. Ms.). Taken at Bassenger and Dunedin, Feb. 27-Apr. 14, by beating wax-myrtle along the margin of dense hammocks.

XII. **Bassareus** Haldeman.

Species resembling those of *Cryptocephalus* in form and size and like them varied in color. They have the front edge of sides of thorax toothed or sinuate, whereas in *Cryptocephalus* it is straight.

81. (15530). **B. brunnipes** (Oliv.).—St. Augustine (Ham.); Crescent City (Sz. Ms.); Pablo Beach, Sept. 5; Lakeland, Mch. 8 (Davis Coll.). LaBelle (Kn.). Gainesville, July 5, on oak (Doz.). Listed as *C.* or *B. congestus*, a synonym.

*82. (15533). **B. detritus** (Oliv.).—Istokpoga, Mch. 29 (Bl., 1923); beating Spanish moss along the edge of a cypress swamp. No other State record.

*83. (15535). **B. croceipennis** Lec., 1880, 199.—Described from Florida. Haulover and Tampa, rare (Sz.). St. Augustine (Ham.). Ormond and Sanford, Mch. and Apr. on oak (Bl., 1914).

*84. (15536). **B. lituratus** (Fabr.).—Northern two-thirds of the State. Common (Sz.). Lake Wales, Mch. 31, sweeping natal grass. Gainesville, Mar.-July (Wat.).

*84a. (15536b). **B. lituratus lativittis** (Germ.).—Same distribution as preceding. Common (Sz.). Lake Wales and Dunedin; common at Dunedin, Mch.-Apr., on oak sprouts, ferns in dense hammocks and dwarf huckleberry.

*84b. (15536c). **B. lituratus vittatus** Suffr.—Enterprise (C. & L.); Ft. Myers (Davis Coll.). Sanford, Palmdale and Dunedin, Mch.-Apr., sweeping grass and low herbage on old pond sites.

*84c. (15536d). **B. lituratus recurvus** Say.—Ft. Capron (Sz. Ms.). Sanford, Apr. 4 on oak.

XIII. **Triachus** Leconte.

Minute (1.2-1.5 mm.), oval, convex species, piceous or dull yellow in hue.

*85. (15537). **T. atomus** (Suffr.).—Northern two-thirds of the State. Eustis, Sanford and Dunedin, Feb.-Apr., on huckleberry and at porch light.

*86. (15538). **T. cerinus** Leconte, 1880, 197.—Common throughout the State on oak, wax-myrtle and other foliage.

87. (15540). **T. postremus** Lec.—St. Augustine (Ham.). The only State record and a doubtful one.

XIV. **Lamprosoma** Kirby.

Small oval convex piceous species, (2.5 mm.), having grooves at the sides of prosternum for the antennae in repose. (Subfamily *Lamprosominae*).

88. (15542). **L. floridanum** (Horn), 1893, 133.—Types from Biscayne Bay. Fort Capron, Cocoanut Grove and Key West (Sz. Ms.). Known only from Florida.

XV. **Colaspis** Fabricius.

Small or medium (4-6 mm.) bronzed or dull yellow species having the thorax margined on sides, the front margin straight. The larvæ feed on the roots of strawberries and other plants, while the adults attack the leaves of grapes and strawberries. The species of this and the genera up to XXIV have the head inserted in thorax to eyes, last dorsal segment covered by elytra, antennae widely separted at base, front coxae rounded, third tarsal joint bilobed. They belong to the subfamily *Eumolpinae*.

*89. (15555). C. **brunnea** (Fabr.).—"Common" (Sz.). Jacksonville (C. & L.). Ormond, Apr. 13. Gainesville on sweet potato foliage, Aug., and cowpeas, July (Doz.). The typical form probably occurs only in the northern third of the State, and both it and var. *flavida* are known as the "grape vine *Colaspis*, "the adults at times riddling the leaves of the vines, the larvae attacking strawberry roots. (Riley, Third Mo. Rep., 1881). Also known to feed on cotton leaves, clover, buckwheat, potatoes and corn.

*89a. (15555a). C. **brunnea costipennis** Cr.—"Not rare" (Sz.). Jacksonville (C. & L.). Ocala and Dunedin, Mch. 16-Apr. 11. Gainesville on velvet beans (Wat.).

*89b. (15555b). C. **brunnea flavida** Say.—Occurs south to Ft. Myers. Common at Dunedin on herbage and at porch light, Mar.-Sept. Gainesville, June-Aug. (Wat.).

*90. (15559). C. **favosa** Say.—"Common" (Sz.). Occurs as far south as Cleveland (Kn.). Frequent about Dunedin, especially so at porch light, June-Sept. Feeds on eucalyptus and grape foliage (Doz.).

XVI. **Rhabdopterus** Lefevre.

Small oblong-oval, convex, shining brown species (4-6 mm.), having the prosternum broad and flat, its sides nearly parallel.

*91. (15563). R. **praetexta** (Say.)—Recorded from several stations as far south as Biscayne Bay (Sz. Ms.). Dunedin, Mch. 20; beaten from the pepper-vine, *Ampelopsis arborea* (L.). Probably in part confused with the next. Usually listed as *R. picipes* (Oliv.). (See Bl., 1923, 30.).

*92. (——). R. **blatchleyi** Bowd.[5], 1921, 234.—Types from Dunedin, collected by me. At hand from Sanford, Arch Creek, Little River, Bassenger, L. Okeechobee, Sarasota and Dunedin, and probably occurs throughout the southern half of the State (Bl., 1923). On flowers of thistle and foliage of various shrubs in March and April. Larger and more oblong than *praetexta*, with antennal joints 7, 10 and 11 dark.

XVII. **Graphops** Leconte.

Small subcylindrical, convex pubescent species (2.5-4 mm.), brown or coppery bronzed in hue, the thorax without side margins and head with a groove above the eyes. The larvae occur about the roots of the evening primrose, *Onagra biennis* (L.), strawberry and other plants, the adults, often in large numbers, on the foliage.

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[5] The Entomologist, London, LIV.

*93. (15566). **G. varians** Lec.—Dunedin, Mch. 19-Apr. 10 (Bl., 1920a); the only record for the State. Beaten from oak and taken from the American sea-rocket, *Cakile edentula* (Bigel.), a fleshy crucifer growing along the bay beach.

*94. (15568). **G. curtipennis** (Melsh).—Northern three-fourths of the State, perhaps throughout. At hand from five stations. Very common, Feb. 24-Mch. 28, on St. Andrew's Cross, *Ascyrum hypericoides* L. at both Ft. Myers and Palmdale.

95. (15569). **G. marcassitus** Cr.—"Haulover, New Smyrna and Tampa, not rare" (Sz.). Not since recorded.

XVIII. **Xanthonia** Baly.

Small dull brown or fuscous pubescent species (3-3.5 mm.), without a groove above eyes, thorax transverse, front femora toothed. The adults occur on oak and hazel, and are sometimes injurious to grapes. Larvae unknown.

*96. (15574). **X. villosula** (Melsh.)—Dunedin, Mch. 18. Beaten from wax-myrtle. The first record for the State.

XIX. **Fidia** Baly.

Species resembling *Xanthonia* but larger (5.5-7 mm.), the thorax cylindrical and femora not toothed. The adults occur on both wild and cultivated grape and allied plants, often doing much damage by riddling the leaves, while the larvae feed on the roots.

97. (15577). **F. viticida** Walsh.—"Middle States to Dakota, Florida and Texas" (Horn, 1892). No other State record can be found except that of the Leng Catalogue.

*98. (15578). **F. longipes** (Melsh.).—One specimen at hand taken June 21 by P. W. Fattig at Gainesville. The first record for the State.

XX. **Metachroma** Leconte.

Small to medium, glabrous, oval, convex species (3-6.5 mm.), dull yellow to piceous-brown in hue, having the thorax margined on sides and head with grooves above the eyes. The adults occur on oak and other foliage, and are sometimes injurious to grapes, pecans, chestnuts, etc. The habits of larvae are unknown.

99. (15582). **M. dubiosum** (Say).—Atlantic Beach, Slosson Collection, Jan.-Mch. (Leng Ms.). No other State record.

*100. (15588). **M. terminale** Horn, 1892, 215.—Types from Biscayne Bay and Key West. Big Pine Key, Sept. (Davis Coll.). At hand from Cape Sable, Key West, Chokoloskee and Caxambus. Beaten from shrubs in hammocks (Bl., 1920). A member of the Tropical life zone.

101. (15590). **M. interruptum** (Say).—Crescent City (Sz.) Ms.). No other State record.

102. (——). **M. robusta** Blatch., 1924.—Ft. Myers, Fla., Apr. 20. Taken by Davis; type in his collection.

(To be Continued)

The
FLORIDA ENTOMOLOGIST
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A NEW APHID ON CITRUS

For the past year or more growers in certain sections have been having trouble with an unusually heavy infestation of aphids on citrus. Until recently it was assumed that this was our old acquaintance, *Aphis gossypii,* but during March and April of this year the trouble increased to serious proportions and efforts were made to determine the best method of control.

In line with this attempt Mr. Beyer, of the Department of Entomology of the Experiment Station, spent a week in Polk County, studying the insect and the best method of control. He at once recognized that the insect was not *Aphis gossypii,* but was unable to place it. He sent specimens to Washington, as did also Mr. Yothers, of the U. S. Bureau of Entomology, and there it was provisionally determined by Mr. Mason as *Aphis citricola,* a European species, but further study convinces him that it is not that species. It seems to be a new species.

This new turn of affairs has naturally caused much concern among the growers. Indeed the behavior of the insect,—its rapid spread and the extremely heavy infestation,—is typical of a recently introduced species.

The editor and Dr. E. W. Berger, of the Plant Board, and Dean Newell inspected many groves in all sections of the infested area. The extent of the infestation and damage is certainly serious. With the exception of the very first flush of growth in the early spring, in many groves all new growth has been completely prevented from expanding, and a large proportion of fruit, particularly that from the later blooms is on the ground, and practically all the remainder extremely rough and deformed.

However, those inclined to regard the situation with pessimism should be reminded that the common predators of other aphids were observed working on this species in abundance. Three species of lady-beetles, the Convergent, the Blood Red, and the Twice-Stabbed Lady Beetles, were present in the order named as far as abundance is concerned. Syrphus fly larvae were numerous as well as the larvae of aphis lions and trash bugs. Mr. Beyer's observations in Polk County show that the same is true there. But the little hymenopterous parasite that is often so effective in keeping down *Aphis gossypii* was not observed. A small brownish beetle, identified by W. S. Blatchley as *Cyphon perplexus* Blatch., is predaceous on this aphid.

The factor which makes a recently introduced insect so destructive is lack of enemies. This aphid has enemies. Just how effective they will be in checking the infestation it is as yet too early to state.

Mr. Beyer has taken up the study of this insect intensively, to work out its life history particularly with reference to its enemies, both insect and fungus.

This aphid differs from *A. gossypii* in the large proportion of winged adults which are very active. These winged forms have a dark brown thorax and green abdomen.

MEETINGS OF THE SOCIETY

Feb. 28. The Society met in Science Hall, President Merrill in the chair. Members present, Bates, Berger, Gray, Merrill, Thone, Walker, and Watson.

The paper of the evening on the Orthoptera of Florida was read by Mr. F. W. Walker and discussed by those present. Mr. Walker reported 210 species and varieties from Florida. The following are to be added to those recorded by Blatchley (1920) from the state:—*Parcoblatta zebra* Hebard, *P. divisa,* Hebard, *Melanoplus querneus* R. & H., *Pterophylla camellifolia* Fab., *Neoconocephalus palustris* Blatch., *Orchelimum minor* Brunner, *Conocephalus saltans* (Scudder), *Oecanthus exclamationis* Davis. A few additional species have been recorded from Thomasville and Billy's Island, Ga., a few miles only from the Florida line, and doubtless occur within the state. Sixty-four of the 210 species have been described since 1900.

As in the case of other insects and plants the Orthoptera of the extreme southern part of the state differ radically from those of the northern part, being related to or identical with West Indian forms. Mr. Walker would draw the line thru Brevard, Orange, Lake and Hernando Counties. (This is further north, particularly on the West Coast, than the botanists usually draw the dividing line—Ed.)

Representative of these southern forms would be *Plectoptera poeyi,* a Cuban form taken at Key West; *Anaxipha imitator* (Cuba); *Orocharis gryllodes* (W. I.), *Tafalisca lurida* (W. I.).

Among the problems that need attention are: the relation of Florida forms or races to those outside the state, (Mr. Walker mentioned particularly *Brachypterus melanopli* and *Pterophylla camellifolia* in this connection) and the geographical and ecological distribution within the state, a practically untouched field.

The speaker mentioned as particular regions that need attention the northern tier of counties, the Apalachicola region where many relics are found among the plants, the coastal islands, the tropical hammocks and the mangrove swamps. As an example of the result to be expected from working unpromising and little studied habitats he mentioned the following rare forms found during a brief investigation of a mangrove swamp: *Euborellia ambigua, Hygronemobius alleni, Anaxipha scia.*

The thick tropical hammocks have already yielded Phrixa maya, a Yucutan species; Turpilia rostrata; Oligacanthopus prograptus, known only from south Florida; Anaxipha imitator; Orocharis gryllodes and Tafalisca lurida.

ON A COLLECTION OF THYSANOPTERA FROM HONDURAS

J. R. WATSON AND T. H. HUBBELL

The following is a report on a collection of thrips taken by the junior author along the Tela and Truxillo divisions of the United Fruit Company's railroad at Honduras during March, April and May 1923. All data on distribution and food plants are from his field notes. The insects were determined by the senior author. Two of the seven species (Sedulothrips hubbelli and Liothrips perseae) were new and have been described elsewhere (Bull. 168, Fla. Agric. Exp. Station).

Heliothrips haemorrhoidalis (Bouche). The greenhouse Thrips.
On avocadoes, Puerto Arturo. Mar. 13.

Selenothrips rubrocinctus (Giard). The red-banded Thrips.
On cocoa plants. Tela Division, Colorado District, Aguas Calientes Farm. Not found on Dakota Farm.

A common and destructive pest of cacoa, avocado, and many other plants in the West Indies, S. Fla., Ceylon, H. I., Uganda.

Franklinothrips vespiformis (Crawford).

On cacoa plants infested with Selenothrips on which it was doubtless feeding.

Sedulothrips hubbelli Wats.

Tela Division, Guamas District. May 2, 3, 10. On branches of a strangling fig tree immediately after it was felled and on bark and log of one felled two weeks previously. Very rapid runners which take refuge in cracks when disturbed.

Liothrips zeteki Hood.

Swept from low bushes and dry herbs at the base of a limestone cliff. Truxillo (Puerto Castilla) Division, Piedra Blanca Farm. April 9.

Described from Panama and not reported since.

Liothrips perseae Wats.

Abundant on young avocado tree, in the bud scales and between very young developing leaves, for the most part on the terminal shoots. Both adults and nymphs present. Puerto Arturo, about 5 kilometers inland from Tela. Mar. 13, 15, April 4.

Leptothrips mali (Fitch).

On a mimosa-like shrub in ditch along railroad at Puerto Arturo. A common predaceous thrips found over most of North America from Panama to B. C. and Mass.

Symphothrips punctatus Hood and Williams.

March 15. Described from Orlando, Florida, and since reported from Miami and Cuba. The senior author has it from Panama (collected from under the cap scales of cocoanuts by Geo. B. Merrill of the Fla. State Plant Board) and Ala. (collected from a satsuma tree by H. P. Loding in Mobile Co.).

Dicaiethrips brevicornis (Bagnall).

A nymph was beaten from the lower branches of a sour sop tree at Puerto Arturo on March 13; several adults on April 4. Found on clothing while passing thru a Guinea Grass pasture, Progresso Mar. 23 (W. C. Bonacker, Coll.). Sweeping the air from a motor car on the railroad between Maloa Farm and Taujica Farm. On foliage of cacao; not common at this season altho Mr. Davis stated that it is the common form at some seasons, Colorado District, Dakota Farm. Swept from the luxuriant growth of grasses and vines in the ditch at the side of the railroad thru the bananas, Dokota Farm, May 25.

Previously reported only from Trinidad and St. Vincent, W. I.

Elaphrothrips longiceps (Bagnall).

On avocado trees. Found among the bud and scales and between the young developing leaves, for the most part on the terminal shoots. Both adults and nymphs present. Puerto Arturo Farm, Mar. 13.

Reported from Mexico and Nicaragua.

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THE CHRYSOMELIDAE OF FLORIDA

By W. S. Blatchley
Dunedin, Florida

(Continued from Vol. VII, No. 4)

*103. (15593). **M. laevicolle** Cr.—Enterprise and Lake Ashley (Sz.); L. Poinsett (Sz. Ms.). Dunedin, July 24, at porch light.

*104. (15594). **M. ludidum** (Oliv.).—Eustis, Apr. 7, beaten from oak; Dunedin, Mch. 29-July 1, on the latter date at porch light. Known heretofore only from South Carolina and Georgia.

105. (15595). **M. marginale** Cr.—"Common" (Sz.). Gainesville, beating oak foliage, Apr. 3 (Doz.). These records may refer to *luridum.*

*106. (15596). **M. maculipenne** Sz., 1878, 366.—Types from Enterprise on live oak, *Quercus virginiana* Mill. Occurs south, at least to Miami, LaBelle and Marco. Frequent about Dunedin on oak; at Palmdale swept in numbers from a species of St. Johnswort, *Hypericum.* I have recently taken this species in Posey Co., Ind.

*107. (15597). **M. pellucidum** Cr.—Frequent as far south as L. Wales. Common about Dunedin, Nov.-Apr., on oak, wax-myrtle, etc.

*108. (——). **M. testacea** Blatch., 1920. 70.—Types from Key West, Mch. 1-3, by beating shrubs.

*109. (15598). **M. pallidum** (Say).—Throughout the State. Dunedin, Nov.-Apr., by sweeping tall grasses about the margins of ponds, also on foliage of red bay, *Persea borbonia* L.

*110. (15599). **M. floridanum** Cr., 1873, 43.—Types from "Florida." Ranges as far south as Biscayne Bay. Sanford and Dunedin, Mch.-Apr.; at Dunedin taken only on Hog Island, in the axils and on the heads of the yellow thistle.

111. (15600). **M. puncticolle** Lec.—Crescent City, Apr. (Wic.). Orlando and Cleveland (Kn.). Known from Georgia and Texas.

*112 (——). **M. strigicolle** Blatch., 1924.—Types from Dunedin Mch. 21-Apr. 11; taken at porch light.

*113. (15601). **M. quercatum** (Fabr.)—"Common" (Sz.). Ranges south to Lakeland and Dunedin. Taken at Dunedin only in April by sweeping huckleberry and other low herbage.

XXI. **Myochrous** Erichson.

Medium sized oblong, convex species (5-7 mm.), piceous-brown, thinly clothed with hair-like scales, the thorax toothed on sides and with postocular lobes in front. Larvae unknown.

*114. (15608). **M. denticollis** (Say).—Common (Sz.). North half of the State, south to Lakeland and Dunedin. Frequent about Dunedin, Jan.-Apr., in winter beneath cover along the margins of ponds; in spring on huckleberry and other blossoms; once at carrion trap. Gainesville, July-Aug. on grass, ferns and corn (Wat.).

XXII. **Typophorus** Erichson.

Rather large (6-7.5 mm.), oval, convex, greenish-blue, glabrous shining species, with punctures of elytra in regular rows and hind tibiae notched near apex. The adults occur on bindweeds, morning glory and other Convolvulaceæ.

*115. (15625). **T. viridicyaneus** Cr.—Gainesville; one eating sweet potato foliage, Aug. 18 (Doz.); one at hand, taken by Fattig, May 14. No other State record.

XXIII. **Paria** Leconte.

Small (3-4 mm.) dull yellow, reddish-brown or blackish species, closely related to *Typophorus*. The larvae feed at times on the roots of strawberry, while the adults occur on wild grape and numerous other plants. Horn (1892, 208) lumped all our forms under one name and Leng so catalogues them. There is no doubt but that three or four distinct species occur in the eastern and southern States.

116 (15626). **P. canella** (Fabr.).—Ft. Myers, Apr. 23 (Davis Coll.); Lawtey, on wild grape (Wat.). Larger than the other forms, dull red with suture and two large spots on each elytron piceous, tibiæ and tarsi fuscous. The *T. canellus quadriguttatus* listed by Wickham from Ft. Myers was probably this form.

*116a (15626a). **P. canella aterrima** (Oliv.)—Throughout the State. At hand from six stations, Dec.-Apr. Taken by beating in dense hammocks; also beneath cover, and once several specimens by sifting a pile of rotten unhulled rice. Gainesville, always in low ground, July-Oct. (Wat.).

*116b (15626h). **P. canella thoracica** (Melsh.)—Dunedin, Apr. 19; sweeping low herbage.

*116c (15626e). **P. canella quadrinotata** (Say.).—At hand from Sanford, Palmdale, Ft. Myers, Tarpon Springs and Dunedin, Mch.-Apr., by sweeping St. Johnswort, tall grasses, etc., near ponds.

*116d (15626g). **P. canella sexnotata** (Say).—Throughout the State. About Dunedin it is taken frequently—Dec.-Apr., but only by sweeping and beating ferns and other foliage in a dense wet hammock. Mt. Dora on oak, June (Wat.). It is this variety and *aterrima* whose larvæ do much damage to strawberries in the North.

The last four forms mentioned are, as treated by Horn, only color varieties of one species, but whether that species is typical *canella* or not, is questionable. It should probably be known as *aterrima* (Oliv.). The *P. sellatus* Horn and *P. opacicollis* Lec. are both, in my opinion, valid species.

*117 (——). **P. opacicollis** Lec.—Gainesville; taken by Watson in July by beating along the edge of a cypress swamp. Since I first recorded this form from Florida (1923, 31) I have taken several additional examples in Indiana, and a careful study of them shows that they are undoubtedly distinct from any of the forms listed as varieties of *canella*.

XXIV. **Labidomera** Chevrolet.

Large oval, strongly convex species (8-12 mm.) having the elytra yellow with large black markings; front femora of male strongly toothed. Adults on milkweed. This and the genera up to XXIX possess the characters mentioned under *Colaspis* except that the front coxae are transverse and the third tarsal joint usually entire. (Subfamily *Chrysomelinae.)*

*118 (15639). **L. clivicollis** (Kirby.)—Dunedin, Feb.-Mch.; taken by beating dead leaves and bunches of the slender climbing milkweed, *Metastelma scoparium* Nutt. (Bl., 1919). The only definite record for the State.

XXV. **Leptinotarsa** Stal.

Oval, strongly convex species of medium size (6-11 mm.) having the elytra dull yellow, with double rows of confluent punctures, the suture and five narrow stripes on each black; front femora unarmed.

119 (15648). **L. decemlineata** (Say).—Northern tier of counties from Pensacola to Jacksonville; on the Gulf coast as far south as Panama City *(Wat.)*. Known as the "Colorado potato beetle." Food plants, potato, horse nettle and other Solanacea. No definite Florida record in any of the literature at hand.

XXVI. **Calligrapha** Erichson.

Oval, convex species of medium size (6-9 mm.), having the elytra yellow with brown stripes or small bronzed spots, and sides of thorax not thickened, third tarsal joint entire. Both larvae and adults feed on foliage of various species of shrubs and herbs.

*120 (15665). **C. similis** Rog.—Northern two-thirds of the State. At hand from Gainesville, Lakeland and Dunedin. Frequent about Dunedin, Dec.-Mch., on flowers of various Compositæ.

121 (15667). **C. cephalanthi** Sz., 1878, 366.—Types from Ft. Capron, L. Harney and Tampa. Enterprise (C. & L.). Ft. Myers, Apr. 26 (Davis Coll.) (Bl., 1923). Labelle (Kn.). Occurs only on the button-bush, *Cephalanthus occidentalis* L.

*122 (15671). **C. scalaris** Lec.—Entérprise and Tampa, as *multiguttis* Stal., a synonym (Sz.); Crescent City (Wic.). At hand from Ormond, Utopia and Dunedin, Dec.-Apr. Scarce about Dunedin on foliage of wax-myrtle. Knab once identified this for me as *C. rhoda floridana* Knab (Ms.), and I have sent them out under that name, but I can see no difference between them and typical *scalaris* from Indiana.

XXVII. **Chrysomela** Linnæus.

Medium sized oval convex species (7-9 mm.) having the elytra wholly blackish- or greenish-bronzed, and the side margins of thorax thickened. The adults occur on cacti and thistle.

*123 (15692). **C. subopaca** Rog.—Crescent City and Bartow (Sz. Ms). At hand from Jacksonville and Gainesville. La Belle, Apr. (Kn.). Occurs on rape (Wat.).

XXVIII. **Phædon** Latreille.

Small oval greenish species (3-4 mm.) having the third tarsal joint emarginate, sides of thorax not thickened. Habits not known.

124 (15699). **P. viridis** (Melsh.)—"Enterprise and Tampa, rare" (Sz.); Crescent City (Sz. Ms.)

XXIX. **Lina** Redtenbacher.

Oblong-oval, sub-depressed species of medium size (7-9 mm.) having the elytra dull yellow interrupted with black lines; sides of thorax thickened, third tarsal deeply bilobed. Food plant, willow, cotton-wood, etc.

*125 (15710). **L. scripta** (Fabr.)—Recorded from numerous stations as far south as Miami and Everglade. At hand from eight localities, Feb.-Apr.; taken mainly by beating a dwarf willow. On Carolina poplar, Gainesville, Aug. 20 (Doz.). No Carolina poplars in Gainesville (Wat.).

XXX. **Monocesta** Clark.

Very large oval, blue and yellow species (10-16 mm.) having the claws of tarsi bifid, outer edge of tibiae deeply sulcate, thorax with a broad median transverse impression. The species of this and all the genera up to XXXVIII have the head inserted in thorax to eyes, antennae close together at base, last dorsal not exposed, front coxae conical, prominent, hind femora slender. (Subfamily *Galerucinae.)*

*126 (15720). **M. coryli** (Say).—Palmetto, July 3, on elm (Bl. 1918). The only State record. The largest of our Chrysomelidae. Occurs on hazel in the North.

XXXI. **Halticidea** Hom.

Very small, oblong-oval species (2.5 mm.) having the elytra bluish-green and tibiae feebly carinate on outer side.

127 (15722). **H. Modesta** Horn., 1893, 62.—Types from Biscayne Bay, Cocoanut Grove (Sz. Ms.). No other records.

XXXII. **Trirhabda** Leconte.

Elongate-oblong, medium sized pubescent species (7-10 mm.), dull yellow with dark stripes on elytra and having the third joint of antennae shorter than fourth, front coxal cavities open behind and tarsal claws deeply bifid. Both adults and larvae feed on the foliage of prickly ash, *Xanthoxylum americanum* Mill., and other Rutaceæ.

*128 (15724). **T. tomentosa** (Linn.)—Northern portion of the State south to Sanford and Dunedin. Abundant at Dunedin, Mch.-Apr., defoliating the tooth-ache tree, *Xanthoxylum clava-herculis* L. Gainesville, Apr.-May, on citrus, pecan and prickly ash (Wat.).

129 (15725). **T. brevicornis** Lec.—"Enterprise, common" (Sz.); St. Augustine (Ham.); Gainesville, Apr., defoliating prickly ash (Doz.).

*130 (15726). **T. virgata** Lec.—"On the Atlantic coast from Massachusetts to Florida" (Horn, 1893). Dunedin, July 1, at porch light.

XXXIII. **Galerucella** Crotch.

Small oblong-oval, dull brown or reddish, pubescent species (3.5-6 mm.), the elytra usually with three or more narrow dark stripes; third joint of antennae longer than fourth. Both adults and larvae occur on plants of various kinds, especially those growing in moist places.

*131 (15744). **G. americana** (Fabr.).—"Tampa, very rare" (Sz.). Dunedin, Jan. 1; one specimen beneath bark of dead oak. No other State records. Occurs on golden-rod.

*132 (15745). **G. sexvittata** (Lec.).—Lake Wales and Dunedin, Dec. 31-Apr. 13; taken by sweeping low herbage along the borders of hammocks and found hibernating beneath pine bark (Bl. 1923). Lakeland, May 8 (Davis Coll.).

*133 (15748). **G. integra** (Lec.).—"Common" (Sz.). Ranges south to Tampa (Sz. Ms.) and Lake Okeechobee. One specimen at hand from the latter point, May 3.

*134 (15749). **G. notulata** (Fabr.)—Northern three-fourths of the State, south to La Belle. At hand from five stations, Dec.-Apr.; the most common species about Dunedin. Occurs on ragweed, *Ambrosia* and other herbage.

*135 (15750). **G. notata** (Fabr.).—"Enterprise and Tampa, rare" (Sz.). Sanford, rare, Apr. 3, swept from boneset, *Eupatorium perfoliatum* L.

*136 (15751). **G. nymphææ** (Linn.).—Moore Haven, Mch. 2; on flowers of yellow water lily (Bl. 1919). The only record for the State.

*137 (——). **G. bivittata** Blatch., 1920, 70.—Types from Dunedin, Mch. 21; swept from huckleberry blossoms. The only record.

XXXIV. **Monoxia** Leconte.

Resembles *Galerucella* very closely. Tarsal claws narrowly bifid in males, simple in females; antennae not reaching middle of body. The species occur near the coast, usually on submaritime plants.

*138 (15755). **M. puncticollis** (Say).—Occurs on both the Atlantic and Gulf coasts. At hand from Ormond, Key West, Everglade and Dunedin, Nov.-Apr.; recorded from several other stations. Swept from a swamp golden-rod growing in brackish water, and from the foliage of the mangrove, *Rhizophora mangle* L. Formerly listed as *Galeruca maritima* Lec. Varies much in color, many specimens being devoid of the usual elytral dark stripes.

*139 (15758). **M. batisia** Blatch., 1917, 273.—Types from Hog Island, opposite Dunedin, Jan.-Apr., where it occurs in numbers on the saltwort, *Batis maritima* L., a fleshy-leaved seaside plant. No other record.

XXXV. **Diabrotica** Chevrolat.

Small or medium oblong-oval, glabrous species (4-7 mm.), dull yellow in hue, the elytra with black stripes or spots, thorax impressed at middle, front and middle tibiae with spurs. Both larvæ and adults are active plant feeders, the former attacking the roots, and often doing much damage to cultivated crops.

*140 (15769). **D. 12-punctata** (Fabr.).—Throughout the northern three-fourths of the State, but less common than in the North. At hand from Sanford, Dunedin and Ft. Myers, Dec.-Mch.; taken by sweeping golden-rod and other weeds in gardens. Gainesville, abundant the entire year (Wat.).

*141 (15781). **D. vincta** Lec., 1878, 416.—Types from Capron, "Tampa and Orange Co., very rare" (Sz.). Enterprise (C. & L.); Ft. Myers (Wic.). Lake Okeechobee, rare on *Ambrosia* (Bl. 1914). Dunedin, Mch.-Apr.; on ferns in dense hammocks, and at porch light.

*142 (15782). **D. vittata** (Fabr.)—Throughout the State, common in the northern and southern thirds, much less so in central one. Big Pine Key (Davis Coll.). Frequent in gardens at Canal Point and Moore Haven, Mch.-Apr. This is the "striped cucumber beetle," very injurious to cucurbs of all kinds; "also on satsumas" (Wat.).

XXXVI. **Phyllobrotica** Redtenbacher.

Medium sized, elongate-oval (5-6 mm.) black and yellow species, thorax transverse, impressed, tibiae without spurs. Usually found on marsh plants.

*143 (15791). **P. costipennis** Horn, 1893, 99.—Types from Georgia and Florida. Crescent City (Sz. Ms.). Clearwater and Sanford (Wic.). Ft. Myers, Mch. 30 (Davis Coll.). Gainesville, in flat woods, July 4 (Wat.). Orlando and La Belle, Apr. (Kn.).

*144 (15792). **P. discoidea** (Fabr.).—Ocala, Apr. 14 (Bl. 1923). The only State record.

XXXVII. **Luperodes** Motschulsky.

Small oblong-oval pale brownish-yellow species (3-4.5 mm.) having the head transversely grooved between the eyes, thorax not impressed, tibiae with spurs, first joint of hind tarsi longer than the next two.

145 (15810). **L. varicornis** Lec.—St. Augustine (Ham.). The only State record. Known from Georgia.

XXXVIII. **Cerotoma** Chevrolat.

Small oblong-oval species (3.5-5 mm.), dull yellow, rarely reddish, with black spots; front coxal cavities closed behind; tarsal claws appendiculate. Injurious to beans, bush clover and other legumes.

146 (15854). **C. trifurcata** (Forst.).—"Cedar Keys, one specimen" (Sz.). Gainesville, taken in abundance on cow-peas (Doz.).

XXXIX. **Blepharida** Rogers.

Robust oval convex species of medium size (5-7 mm.), dull yellow with reddish-brown markings on elytra; front coxal cavities closed behind. Occurs on sumac, *Rhus*. In this and following genera up to LVIII the hind femora are greatly enlarged and thickened for leaping. They form the subfamily *Halticinae*.

*147 (15858). **B. rhois** (Forst.).—Northern three-fourths of State, south to Palmdale. At hand from L. Wales, Palmdale and Dunedin, Feb.-Mch.; swept from sumac.

XL. **Hypolampsis** Clark.

Small oblong-oval, piceous species (2-4 mm.), thickly clothed with grayish pubescence and erect brown hairs; front coxal cavities closed behind; elytral punctures in rows; last joint of hind tarsi globosely inflated.

*148 (15861). **H. pilosa** (Ill.).—"Tampa, very rare" (Sz.). Enterprise (C. & L.). St. Petersburg (Wic.). Scarce at Dunedin, Mch.-Apr., on weeds along the borders of ponds.

XLI. **Hamletia** Crotch.

Small elongate-oval black species with green elytra (3.5 mm.); elytral punctures confused; front coxal cavities open behind; first joint of hind tarsi short and broad, last one globosely inflated.

149 (15864). **H. dimidiaticornis** Cr.—"Lake Ashley, one specimen in June" (Sz.). Jacksonville (Sz. Ms.). No other State records.

(To be continued)

The

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LIFE HISTORY OF THE NEW CITRUS APHIS

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Assistant Entomologist,
Experiment Station

The life history studies of this species have been somewhat complicated because of its alternate host plants.

We have carried on generation studies from May 2d to June 20th in the field, at Lakeland, Florida. Since that time these studies have been transferred to Gainesville, where they are now being conducted. A summary of these studies thus far gives the following results.

Viviperous females were used in starting these studies as no eggs or stem mothers were found. The reproductive period of the female varied, during the time of these studies, from 2 to 11 days, with an average of five young per day. The longevity of the females used ranged from 3 to 21 days. In most cases death was due to natural causes. We must, however, take into consideration the conditions of temperature and humidity which would have some influence on the mortality, as the experiments were conducted under a tent where the temperature ranged from 85 to 98 degrees.

The maximum number of young produced by a single female was 61, and the minimum was 8. The birth rate was highest in the early life of the female and the largest number of young were brought forth during the morning hours. The percentage of winged individuals produced during this series of experiments ranged from 45 to 69.

DESCRIPTION

Alate Viviperous Female. Eyes carmen; body rather long and plump; head normal, dark; antennae shorter than body, reaching approximately the 4th or 5th abdominal segment; sensoria present; body dark green, with dark irregular area covering most of the torsal part of the thorax. Cornicles dark, slender, tapering slightly at the apex and reaching almost to the end of the cauda. Cauda twice as long as tarsi; fusiform, and slightly constricted at the base of the body; supporting four slender, curved, projecting lateral hairs on each side of the cauda. Wings normal.

Apterous Viviperous Female. Eyes carmen; body pea green with dark green shading on thorax; head normal; antennae shorter than body, reaching approximately the 4th or 5th abdominal segments; sensoria present; cornicles dark, slender, tapering slightly at the apex and reaching almost to the end of the cauda. Cauda twice as long as tarsi; fusiform and slightly constricted at base of body; supporting four slender, curved, projecting lateral hairs on each side of the cauda. No wings.

STAGES

This insect was found to have five instars with four molting periods. The length of the first instar was about 20 hours, the second was about 24 hours, the third about 26 hours, the fourth about 30 hours, and the fifth about 35 hours. The range of life of the nymph was from 5 to 11 days. The period of birth was on an average two and a half minutes, and the period of molting ten minutes.

Molting. The time required for molting was observed to be from 10 to 20 minutes. The skin divides at the head which is moved forward and forced out of the cast. The feet and antennae are released first, followed by the body, the cauda being the last portion to be extracted.

First and Second Instars. The first and second instars of this insect are almost identical in form, except that in the second instar the body becomes somewhat enlarged and elliptical in shape, tapering to a rounded point at the cauda; while in the first stage nymph the lateral portions of the body are almost parallel with the head, and the cauda tapers abruptly. Eyes reddish.

The second stage nymph soon after molting takes on a pea green color. The last two segments of the feet are a dusky color, and the last two joints of the antennae are also dark. The distal half of the cornicles are darkened, beginning at the tip, with a dusky area on body joining the cornicles. Eyes dark red. Cauda pea green with blackish tip. The nymph moves about quite freely until a suitable place is found, but is very quiet while feeding.

Third Instar. Eyes red. Body pea green. Body gradually becomes enlarged from the head almost to the cornicles at which point the abdomen tapers off to the cauda. Cornicles almost transparent with dark tips; dark greenish area between the cornicles. In the individuals destined to become winged the wing pads begin to develop.

Fourth Instar. Similar to the third. Body slightly more enlarged. Last antennal segments dark. Cornicles about one third darkened. Wing pads more prominent.

Fifth Instar. Color of head and thorax, amber. Abdomen light green. Eyes dark red. Antennae and wings whitish, as well as legs. Coxae dark. Wing pads, when present, very prominent. Distal half of cornicles darkened. Wings are rolled in a window curtain manner over dorsal side of body. After the skin is shed the wings, which have a silvery, crystalline appearance, gradually unfold and are spread out by the newly emerged adult to dry.

HOST PLANTS

In the field citrus has been found to be the most commonly infested, especially certain varieties of the mandarin family. The varieties of citrus were infested in the following order; those most heavily infested being placed first: King orange, Temple orange, Tangerine, pineapple orange, Valencia, and grapefruit.

The writer also carried on experiments on many plants as hosts, both in the laboratory and in the field. In the field it was found on loquat, wild plum and sand pear, and in the laboratory we were successful in breeding it on night-shade, Jerusalem Oak, milkweed, dogfennel, cudweed; also on lettuce and peppers. At the present time, however, the writer is conducting his experiments most succcessfully on Chinese spirea, on which the insect in question seems to have all the habits and characteristics of a species on its native host.

CHARACTER OF ATTACK

This aphid, unlike any species which has heretofore been found on citrus, attacks the young tender succulent growth, and the blossoms, calyx and young fruit, as well as the shoots and water sprouts. The method of its attack on the foliage is also characteristic in that it shows a tendency to attack the mid-rib of the leaf together with its branches. As a result a few individuals soon cut off the source of food supply of a leaf, causing it to quickly curl at the point of attack. Repeated examination of cross sections of these leaves has shown many of the cells to be broken down and deficient in protoplasm, leaving a predominating quantity of cellulose.

The injury to the blossoms causes a large percentage of them to fall, while on the young fruit a double injury is inflicted. In the first place the rind of the fruit where it is punctured by the beak of the insect, develops little protuberances or knobs, loosing the smoothness of healthy, uninjured fruit. When punctured near the stem end much of the fruit was found to fall, often several weeks after the outbreak of the infestation. Besides the injury caused by the puncture and removal of the sap from the portion of the tree attacked, it is probable that a toxic effect is also produced by the insect.

NATURAL ENEMIES

It has been the experience of the writer in all his previous work on the Aphididae that in the case of outbreaks the aphids were usually attacked by hordes of natural enemies which soon controlled them, but in this instance the "laissez faire" policy does not seem to do, as this aphis is the least attacked by natural enemies of any species studied. This is due perhaps to several causes such as the recent introduction of the species, or the influence of meteorological conditions.

Of the beneficial insects three groups have been found to work on the aphid in the following order. First in importance about Lakeland is the Family *Coccinellidae*, or lady-beetles, of which the following species were found: The Blood Red, *Cyclomeda sanguinea*, the Twelve-Spotted, *Hippodamia convergens*, the Twice-Stabbed, *Chilcorus bivulnerus;* and the little *Scymnus binevatus*. Next in economic importance are the syrphus fly larvae, *Allogapta obliqua*, and *Lysephaebus testaceipes*, and third the Green Lace Wing Fly or Golden Eyed Lace-Wing of the Chrysopa genus.

Numerous collections of specimens were made for the purpose of determining whether any fungi were of economic value in the control of this pest, but no definite results were obtained. Among the enemies of lesser importance were recorded the tree cricket, and the lizard "camaleon."

Relation Between Ants and Aphids. An intimate relation was observed between ants and this species of aphid. Wherever ants were found to be numerous, the aphids were also found to be well colonized. Three species of ants were noted by the writer, the most abundant being a species of *Camponotus*. The principal function of the ants was found by repeated observations and studies both in the laboratory and field, to be the removal of the honey dew from the foliage, thus keeping the leaves and twigs clean and conditions most favorable for the aphids. Where there were no ants it was found that many of the nymphs in moving about during feeding became entangled in the honey dew, which finally caused the weak individuals to perish. Much was done, therefore, toward the control of the aphids when all the ant colonies were destroyed.

CONTROL MEASURES

In the solution of the problem on which the writer was working it was obvious that measures for effective control must be tested out. The first experiments, conducted on April 10th when the outbreak was at its peak, consisted in testing spraying as an effective control measure. Where nicotine sulphate was used in a spray of 1 to 800 combined with either whale oil soap or Octagon laundry soap, one pound to each five gallons of water, it was found that very efficient results were obtained where it was possible to get the spray into actual contact with the insect. But this was not always possible because of the abundance of the curled foliage which served as a protection for many of the insects.

With the contact dusts, however, especially the three percent nicotine dusts, we estimated the kill to be about 95 percent where the experiments were conducted under the writer's personal attention. The spraying experiments showed an average killing of 85 percent.

These experiments were conducted on three-year-old Temple Orange trees in the Templetown Groves, Lake Wales, on April 9th, 1924, between 9:30 A. M. and noon. It was a bright sunny day, with a temperature of 80 degrees and a westerly wind blowing about 15 miles an hour.

Following is a table giving relative cost of spraying and dusting:

Spraying Machine:	300 gallon. Bean. Equipped with rods and two lines of hose, spraying four rows at a time.	
		Cost
Mixture:	Lime Sulphur Solution (1 to 40) 7½ gal.	$1.20
	Black Leaf Forty (1 to 800) 3 pts.	5.07
	Kayso 2½ lbs.	.58
	Cost of materials	$6.85

Time:	Actual Spraying, ... 102 min.
	Including loading, ... 120 min.
	Labor, 3 men @ $.25 per hour........ 1.50
	Total cost of spraying........ $8.35
Ground Covered:	548 trees or 4.3 trees per minute at cost of $.015 per tree.
Dusting Machine:	Bean. Dust made in hopper of machine by adding 3 pints of Black Leaf Forty to 50 lbs. of hydrated lime and allowing agitator to run for five minutes.
	Cost
Mixture:	Hydrated lime, 100 lbs........ $1.10
	Black Leaf Forty, 6 pts........ 10.14
	Cost of materials........ $11.24
Time:	1 hour 30 minutes—
	Labor, 2 men @ $.25 per hour........ .75
	Total cost of dusting........ $11.99
Ground Covered:	332 trees or 3.4 trees per minute at cost of $.036 per tree.

A stop was made at each tree of from 5 to 10 seconds. Therefore more dust was used and less ground covered than in the commercial practice of never stopping and only throwing a cloud of dust over the tree. In this instance the tree was dusted from three sides.

Similar experiments have been conducted in Lakeland, to which the writer added oil sprays, kerosene emulsion, soap solution, and the follownig dusts: sulphur, calcium arsenate, combinations of lime and sulphur, and calcium cyanide.

The lowest percentage of kill was obtained from the sulphur dust, medium results were derived from oil, kerosene emulsion and soap emulsion, and the highest efficiency from the nicotine and the calcium cyanide dusts. However, the calcium cyanide was only effective when applied to the trees under tents, in which case a quarter of a pound was applied to four-year-old trees. The tree was left under the tent for a period of four minutes. This gave approximately a 100 percent kill. Some injury was done, however, to the tender foliage as a result of the burning caused by the dust. The nicotine dusts, which gave an average of 95 percent kill, were safer from the standpoint of the burning of the foliage, and had the added advantage of being less destructive to the parasites than was the calcium cyanide.

In our January issue, p. 41, we erroneously recorded Donald Reese as being present at the Cincinnati meetings. It should have been Chas. A. Reese. Mr. Reese, formerly of the State Plant Board, is now engaged in bee inspection work for the State of Ohio with headquarters at Columbus. Mr. Goodwin's initials were also erroneous. They should have been U. C.

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THE CHRYSOMELIDAE OF FLORIDA

By W. S. Blatchley
Dunedin, Florida

(Continued from page 7)

XLII. **Oedionychis** Latreille.

Elongate-oval, glabrous species of medium size (4.5-7 mm.) and variable color, having the front coxal cavities open behind, elytral punctures confused, first joint of hind tarsus slender, last one globosely inflated. Adults occcur on flowers and foliage of various plants, especially Compositæ.

*150 (15865). **O. gibbitarsa** (Say).—"Enterprise and Cedar Keys, common" (Sz.). St. Augustine (Ham.). Pablo Beach, Sept. 5 (Davis Coll.). Moore Haven, Mch. 22 (Bl. 1923), swept from vegetation in marshy ground. All Florida specimens that I have seen have the elytra a deep cobalt-blue in hue, not greenish as in the North.

*151 (15867). **O. thoracica** (Fabr.).—Haulover, one specimen (Sz.). Crescent City (Sz. Ms.). L. Worth (Sl.). At hand from Gainesville and Dunedin, Nov.-Mch.; scarce about Dunedin, flying along the roads.

152 (15868). **O. vians** (Ill.).—"Common" (Sz.) St. Augustine (Ham.). No other State records.

*153 (15869). **O. concinna** (Fabr.)—"Rare" (Sz.). Crescent City (Wic.). At hand from Ormond, Palmdale and Dunedin, Feb.-Apr.; occurs beneath boards and other cover along the margins of ponds, one being dug out of the muck (Bl. 1914).

*154 (15873). **O. fimbriata** (Forst.).—Northern part of the State, south to Ft. Myers. Gainesville on oak, Apr. 18 (Wat.). At hand from Sarasota and Dunedin, Nov.-Apr.; taken on flowers of thistle and swept from tall grass along the sandy margins of ponds. All specimens seen are of the vittate variety formerly listed as *circumcincta* Cr.

*155 (15875). **O. petaurista** (Fabr.).—"Tampa, very rare" (Sz.). Crescent City and Haw Creek (Sz. Ms.): St. Augustine (Ham.): Ft.

Myers (Wic.). Gainesville, eating strawberry leaf, Feb.; on bitter-weed, *Helenium*, Aug. (Wat.). Varies much in size (5.5-8 mm.) and width of dark stripes.

*156 (15877). **O. miniata** (Fabr.).—Northern part of State south to Ft. Myers. Frequent at Dunedin, Nov.-Apr., on dwarf huckleberry and other low vegetation.

*157. (15879). **O. ulkei** Horn, 1889, 188.—Type from "Florida." Haulover, Crescent City, Orange and Sumter Cos. (Sz. Ms.). Enterprise (Wic.). Dunedin, Feb. 24-Apr. 10; occurs on flowers of fetter-bush, *Desmothamnus nitidus* (Bartr.) and other Ericads in low damp woods (Bl. 1923).

158 (15883). **O. indigoptera** Lec., 1878, 416.—Type from Tampa. No other State record. "Occurs in Georgia and Florida" (Horn, 1889.)

*159 (——). **O. saltatra** Blatch., 1923, 32.—Types from Dunedin and Sanford. Frequent about Dunedin in spring on low herbage in moist ground; at porch light, June 15.

*160 (15887). **O. sexmaculata** (Ill.).—Enterprise, rare (Sz.). Gainesville, abundant on foliage of ash, Apr. 5 (Doz.). At hand from Sanford, Apr. 4. A common species in Indiana.

*161 (15888). **O. suturalis** (Fabr.).—Throughout the State, south to Ft. Myers. At hand from six stations. Frequent about Dunedin, hibernating in Spanish moss and occurring in spring on flowers of the gallberry, *Ilex glabra* (L.), and other shrubs.

162 (15869). **O. quercata** (Fabr.).—St. Augustine (Ham.); probably refers to the next; thorax wholly pale.

*162a (——). **O. quercata obsidiana** (Fabr.).—"Baldwin and Enterprise, common," (Sz.). Sanford, Mch. 30-Apr. 5 (Bl. 1923). This variety has the thorax piceous with explanate side margins pale. Leng places it as a synonym of *quercata*.

*163 (15890). **O. scalaris** Melsh.—Northern part of the State, south to L. Okeechobee. At hand from Sanford, Utopia and Istokpoga, Mch.-Apr.; occurs on low Ericads near margins of lakes.

XLIII. **Disonycha** Chevrolat.

Oblong or oval medium sized (4-7 mm.) beetles of varied hue, having the front coxal cavities open behind; thorax without a transverse basal impression; hind tibiae not grooved; first joint of hind tarsi short and rather broad, tarsal joints not inflated. The adults feed upon herbs of various kinds and feign death when disturbed.

164 (15895). **D. pennsylvanica** (Ill.).—"Common" (Sz.). Miami, Moore Haven and Orlando (Kn.). The only records of the typical form for the State. Perhaps apply to var. *parva*.

*164a (15895c). **D. pennsylvanica conjugata** (Fabr.).—Northern part of the State, south to Moore Haven and Ft. Myers. At hand from six stations and reported from many others. Common, where found, on various species of smart-weed, *Polygonum;* also beneath decaying stems of pickerel-weed on old pond sites.

*164b (——). **D. pennsylvanica parva** Blatch, 1921, 16.—Types from

Indiana and Sanford, Fla. At hand from Sanford, Pahoka, Palmdale and Dunedin, Mch.-Apr., from the muck and grass roots about the margins of cypress swamps. But little more than half the size of typical *pennsylvanica*, and probably a distinct species.

165 (15896). **D. quinquevittata** (Say.).—Schwarz in his Florida list records *D. punctigera* Lec. as "not rare." That name is made a synonym of *quinquevittata* by Horn (1889, 314). No other mention from the State.

166 (——). **D. fumata** Lec.—According to Schæffer (1919) the *D. crenicollis* (Say.) of Horn (1889) is this species. Under the latter name it is mentioned by Schwarz (Ms.) as occurring at Jacksonville.

*167 (15898). **D. caroliniana** (Fabr.).—Enterprise and Capron (Sz. Ms.). Lakeland, May 8 (Davis Coll.). At hand from L. Wales, Palmdale and Dunedin. Swept in some numbers, Mch. 28, from the flowers of a tall St. Johnswort at Palmdale. Rare at Dunedin on fetter-bush.

*168 (15901). **D. glabrata** (Fabr.).—Ormond, on oak (Bl. 1902); Dunedin Mch. 9, one specimen at each place. Gainesville, abundant on bull-thistle, Apr.; riddling the foliage of pig-weed, *Amaranthus*, May (Doz.). These the only State records.

169 (15902). **D. abbreviata** Melsh.—Recorded from numerous stations in the northern half of the State. Gainesville, sweeping low herbage Feb. 26 (Doz.); on golden-rod, Sept. (Wat.); these, in part at least, *Oedionychis petaurista* (Fabr.). Schæffer (Ms.) doubts the occurrence of the true *abbreviata* in Florida, but a specimen taken at Lake City, Apr. 18, is in the Gainesville collection.

*170 (15902a). **D. leptolineata** Blatch., 1917, 143.—Types from Dunedin; also taken at Lakeland and Istokpoga. Frequent on ferns in dense hammocks and cypress marshes; also hibernating beneath cover along the borders of ponds. Described as a variety of *abbreviata* but evidently a distinct species.

171 (15906). **D. triangularis** (Say).—Gainesville, Apr. 15; sweeping low foliage along a moist hammock edge, and hibernating under old logs (Doz.). The only State record.

172 (——). **D. albida** Blatch., 1924, 169.—Type in Davis collection; taken by him on Big Pine Key, Sept. 18.

173 (15907). **D. xanthomelæna** (Dalm.).—"Florida" (Horn, 1889). St. Augustine (Ham.) as *collaris* (Ill.), a synonym.

*174 (15910). **D. mellicollis** (Say.).—Capron (Sz. Ms.). LaGrange (Davis Coll.). Bradentown, Oct. (Wat.). At hand from Sanford, Lakeland and Dunedin, Feb.-Apr.; scarce at porch light and beneath cover.

*175 (15911). **D. collata** (Fabr.).—Common along the sea-coast, where it occurs beneath cover, between the roots of grass and on low vegetation close to the water. At hand from Key West and Dunedin. Recorded from many stations, but inland only from Enterprise (C. & L.).

XLIV. **Argopistes** Motschulsky.

Small (3 mm.), hemispherical black and red species resembling *Exochomus* in general appearance; antennae gradually clavate, front coxal cavities open behind.

*176 (15914). **A. scyrtoides** Lec., 1878, 416.—Types from "Florida." Jupiter, on oak; Miami (Sz. Ms.). At hand from Biscayne Bay, Mch. 18, taken by Mrs. Slosson. Mines the leaves of the Florida privet, *Forestiera porulosa* (Michx.) (Sz. Ms.).

XLV. **Haltica** Geoffroy.

Small oblong-oval, convex species (2-5 mm.), blue, dull yellow or bronzed in hue, having the front coxal cavities open behind; thorax with a transverse basal impression, this not limited at each end. The species are numerous and some of them are injurious to grape foliage and garden truck. The genus is a difficult one and there is much confusion of synonymy.

*177 (15917). **H. chalybea** Ill.—Throughout the State, recorded from numerous stations. At hand from seven, including Cape Sable. Common about Dunedin, Nov.-Apr., on foliage of wax myrtle, wild grape, etc., hibernating in bunches of Spanish moss and beneath loose bark. Gainesville, on plum blossoms, Feb. 18, wild grape, Feb. 27 (Doz.); velvet beans (Wat.). Known in economic literature as the "grape-vine flea-beetle."

*178 (15918). **H. nana** Cr.—"South Carolina to Florida" (Horn, 1889). Biscayne Bay (Sz. Ms.). Mt. Dora, Aug.; Gainesville, on *Eupatorium* (Wat.). At hand from Gainesville (Fattig) and Dunedin. Rare at Dunedin, Nov.-Apr., on foliage in sandy open woods. One of the smallest (2 mm.) members of the genus.

*179 (15926). **H. litigata** Fall, 1910, 154.—Type from Enterprise. Throughout the State; recorded as *H. ignita* (Ill.) from numerous stations. At hand from nine localities, Nov.-Apr. Common on the water purslane, *Ludwigia palustris* Ell.; also beneath debris and decaying vegetation about the margins of ditches, ponds and lakes, and occasionally at porch light (Bl., 1923). Fall *(loc. cit.)* assumes that typical *H. ignita* is a "brilliant coppery-golden form of the Middle Atlantic States," whereas *litigata* is blue with protruding eyes and dull brown tibiae and tarsi.

*180 (15927). **H. schwarzi** Blatch., 1914, 141.—Types from Utopia on L. Okeechobee. Taken also at Pahokee and Ft. Myers. Occurs on low vegetation along the edges of lakes and streams. Piceous, strongly bronzed. (4.2-4.5 mm.).

*181 (15928). **H. vaccinia** Blatch., 1916, 95.—Types from Dunedin. At hand also from Caxambus and Ft. Myers. Common about Dunedin, Dec-Apr., on the flowers and foliage of dwarf huckleberry. Uniform dark coppery red. (3-3.2 mm.).

182 (15932). **H. vicaria** Horn, 1889, 222.—"Massachusetts to Florida westward to Colorado and Arizona" (Horn). No other record.

*183 (15942). **H. marevagans** Horn, 1889, 226.—"Along the seacoast region from Florida to New Jersey" (Horn). Pablo Beach and New Smyrna. (Sz. Ms.). Gainesville on *Oenothera*, riddling the plant; also on *Jussieua* Apr.-Sept. (Doz.); maple, June, *Helenium* July, *Solidago* Oct. (Wat.). Scarce on Hog Island, opposite Dunedin, Feb. 5-Mch. 25, on the sea purslane, *Sesuvium maritimum* Walt. (Bl. 1917); also at porch light, July 5.

184 (15953). **H. floridana** Horn, 1889, 230.—Types from Biscayne Bay. No other record.

185 (15954). **H. burgessi** Cr., 1873, 71.—Types from Key West. No other record. The smallest Haltica (1.5-1.7 mm.) known.

*186 (15955). **H. rufa** Ill.—Throughout the State. At hand from six localities, Jan.-Apr. Common at Dunedin, hibernating beneath cover along ponds and marshes, and in Spanish moss, and in spring on low herbage in moist localities.

In addition to the ten species of *Haltica* above mentioned Leng, in his Catalogue, includes *H. carinata* Germ. and *H. torquata* Lec. from Florida. His record for the first is probably based on the *H. exapta* Say. of the Schwarz list, a synonym of *H. carinata,* but Schwarz (Ms.) changes this to *ignita* Ill., which I have included above as *litigata* Fall. Of *H. torquata* Lec. I can find no Florida record, and as Horn makes it a synonym of *carinata,* I have not included it, especially as Fall (Ms.) says: "Almost surely does not occur in Florida."

XLVI. **Lactica** Erichson.

Small oblong-oval, shining species (3-4.5 mm.), pale yellow or with elytra blue. Closely allied to *Haltica* but having the basal impression of thorax limited each side by a longitudinal fold; elytra nearly smooth. Habits unknown.

187 (15960). **L. tibialis** (Oliv.).—St. Augustine (Ham.). Miami (Sz.Ms.). "North Carolina to Florida and Louisiana." Horn (1889).

188 (15961). **L. iris** (Oliv.).—The type of *L. specularis* Harold, a synonym, was from "Florida."[6] No other State record.

XLVII. **Diphaulaca** Clark.

Very small oval glabrous convex species (2 mm.), differing from *Lactica* in the elytra having rows of coarse punctures; thorax reddish-yellow, elytra piceous-black.

189 (15964). **D. bicolorata** Horn.—Enterprise, Apr. 19 (C. & L.). Gainesville, on red buckeye, *Aesculus pavia* L., Mch. (Wat.).

XLVIII. **Crepidodera** Chevrolat.

Small oval, convex glabrous species (2-2.5 mm.) having the front coxal cavities closed behind; elytral punctures in rows; ante-basal groove of thorax limited each side; antennae half the length of body; color greenish-bronzed, brown or black.

*190 (15968). **C. helxines** (Linn.).—"Tampa, rare" (Sz.). Jacksonville

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[6]Horn, Trans. Amer. Ent. Soc., VIII, 1880, 151.

(Sz. Ms.). At hand from Sanford and Pahoka, Mch.-Apr., one specimen from each place. A very common species in Indiana but evidently scarce in Florida. Occurs on willow, elm and other foliage.

*191 (15974). C. **atriventris** Melsh.—"Enterprise and Tampa, rare." (Sz.). At hand from Okeechobee City and Dunedin, Feb. 6-Mch. 27. In February beaten from Spanish moss; in March on ferns and other herbage in dense hammocks or along their edges.

XLIX. **Epitrix** Foudras.

Very small, oval, convex black or brownish species (1.5-2 mm.), close to *Crepidodera* but having the upper surface rather thickly clothed with short, erect grayish hairs.

192 (15981). **E. lobata** Cr.—"New Smyrna", rare (Sz.). Indian River (Sz. Ms.). No other State record.

*193 (15982). **E. cucumeris** Harr.—Moore Haven, mouth of Hillsboro Canal and other points on L. Okeechobee, Mch. 20-24; swept from vegetation in gardens and said to do much damage to egg plant, cucumbers and other truck crops of that region (Bl. 1923). The only State record.

*194 (15983). **E. brevis** Sz., 1878, 367.— Types from Ft. Capron and Enterprise. St. Augustine and L. Worth (Ham.). Frequent about Dunedin in March on ferns and other foliage in hammocks and low moist ground. Gainesville on *Eupatorium*, Oct.; on *Aesculus pavia*, Mch. (Wat.).

*195 (15984). **E. fasciata** Blatch., 1918, 56.—Types from Dunedin. At hand also from Caxambus, Key West and Cape Sable. A submaritime species found in spring on low herbage along the margins of salt water lagoons.

*196 (15986). **E. parvula** (Fabr.).—Throughout the State. Listed by Schwarz as *E. hirtipennis* Melsh., a synonym. Frequent about Dunedin, Mch.-Apr., on ground cherry and other low vegetation in moist grounds. Known as the "tobacco flea-beetle" as it often riddles the leaves of that plant, thereby preventing their use for cigar wrappers.

L. **Orthaltica** Crotch.

Small oblong, parallel glabrous species (2-2.5 mm.), brown or piceous in hue, having the ante-basal thoracic groove not limited each side, and antennae as long as or longer than body.

197 (15988). **O. copalina** (Fabr.).—"Occurs from Massachusetts to Florida, westward to Missouri and Iowa" (Horn, 1889). No definite State record. Occurs in Indiana on sumac and Hercules' club, *Aralia Spinosa* L.

LI. **Mantura** Stephens.

Small oblong-oval, convex species (2 mm.), brownish-bronzed in hue, the tips of elytra paler; thorax without transverse basal impression, but with a short deep longitudinal one each side of base; elytral punctures in rows.

*198 (15993). **M. floridana** Crotch, 1873, 73.—Types from "Florida, Louisiana and Pennsylvania." At hand from Sanford and Dunedin, Mch.-Apr. Occurs in March by hundreds on a species of dock, *Rumex*, growing along the bay beach at Dunedin; also on other herbage in low moist grounds.

LII. **Chaetocnema** Stephens.

Very small, oval, convex black or brownish glabrous species (1.8-3 mm.), having the thorax without basal impression, hind tibiae sinuate and toothed above near apex; elytral punctures in rows; first two ventral segments connate.

*199 (16000). **C. brunnescens** Horn, 1889, 259.—Types from Key West, Punta Gorda and Miami (Sz. Ms.). A submaritime species, at hand from Key West, Cape Sable and Dunedin. Frequent near Dunedin, Nov.-Feb., on the foliage of button-wood and other low shrubs growing near tidewater lagoons.

200 (16001). **C. denticulata** (Ill.)—"Enterprise and Cedar Keys, rare" (Sz.). St. Augustine (Ham.).

*201 (——). **C. floridana** Blatch., 1923, 33.—Types from Dunedin and Lakeland, Dec.-Mch.; taken by sweeping huckleberry and other low vegetation in open pine woods. This is the species I erroneously recorded (1919, 66) as *C. cribrifrons* Lec.

*202 (16003). **C. pinguis** Lec., 1878, 417.—Types from Enterprise and New Smyrna. At hand from Lakeland, Istokpoga and Dunedin, Dec.-Mch. Occurs on low vegetation along the margins of lakes and beneath cover on the bay beach.

*203 (16006). **C. minuta** Melsh.—"Florida" (Horn, 1889). Gainesville (Wat.), Scarce at Dunedin, Mch. 2-30, on herbage growing in low moist ground.

*204 (16008). C. alutacea Cr., 1873, 74.—Types from "Florida." "Common on swampy meadows" (Sz.). St. Augustine (Ham.). Biscayne Bay and Haw Creek (Sz. Ms.). Dunedin, rare, Apr. 8, by sweeping along the margin of a dense hammock (Bl. 1923).

*205 (——). **C. robusta** Blatch., 1923, 33.—Types from Hog Island, opposite Dunedin, where it occurs in some numbers on *Batis maritima* and other herbage growing in areas flooded at high tide. The largest (2.7-3 mm.) of the Florida species of the genus.

*206 (16011). **C. obesula** Lec., 1878, 418.—Types from L. Ashley and Baldwin. Enterprise (Sz. Ms.). At hand from Pahoka, Moore Haven and Dunedin, Oct. 26-Mch. 27. In the truck lands about L. Okeechobee this is one of the three species of flea beetles which are said to do much damage to the crops, the others being *Epitrix cucumeris* and *Chaetocnema quadricollis*.

207 (16013). **C. parcepunctata** Cr.—"Common" (Sz.). The only State record.

*208 (16014). **C. pulicaria** Melsh.—St. Augustine (Ham.). Gainesville, on corn (Doz.). Dunedin, scarce, Dec.-Mch., on low herbage along the margins of ponds.

(To be continued)

The

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THE APHID SITUATION

The new citrus aphis has at last been identified. Dr. Baker of the U. S. Bureau of Entomology states that it is *Aphis spireacola Patch.*, an insect whose known distribution covers most of the United States. Miss Patch, who described the species, is now of the opinion that it is identical with *Aphis pomi*, the Green Apple Aphis. At the Station we have been able to readily transfer the aphis from citrus to apple.

The origin of the outbreak still remains a mystery. Has the insect only recently reached our citrus section, or has it recently developed a strain with an appetite for citrus, or has it been here on citrus in small numbers for many years to develop into a severe pest during the last two years because of weather or other favoring conditions? It is unfortunate that we cannot definitely answer that question, for on the answer hinges the probable future of the pest. If either of the first two guesses is the correct one, we may expect a prolonged fight. If the last is the true one, as Dr. Baker seems to think, we may look for a slump in its numbers perhaps as complete and sudden as its rise. Undoubtedly the aphids are fewer now than at any time since March. But the present ebb in numbers may be a seasonal rather than a permanent one. All aphids are always scarce at this season of the year and there was a similar slump in the numbers of the new aphis last summer. If the outbreak of last spring was caused by favorable weather conditions one would expect that there would have been a similar rise in numbers of other species of aphids. This was distinctly not the case. The melon aphis, for example, was much less destructive than usual. Furthermore if this new aphis has been with us for many years is seems strange that the outbreak should have had a definite center of origin, near Tampa, from which it spread out in all directions. One would have expected the outbreak to have been simultaneous over at least most of the citrus belt.

MOSQUITO SURVEY OF BAMBOO KEY, FLORIDA

By G. F. MOZNETTE

Entomologist, U. S. Department of Agriculture
Miami, Florida

During the month of January 1923, Dr. Joseph Y. Porter, President of the Key West Chamber of Commerce, wrote to Dr. L. O. Howard, Chief Bureau of Entomology, Washington, D. C., stating that he was going to send an inspector to Bamboo Key to investigate the truth of the report that there are no mosquitoes there, and find out the reason for such absence if true. He requested Dr. Howard to send the writer with this inspector. To the best of the writer's knowledge, Dr. Porter's proposed plan never materialized. However, at the request of Dr. Howard, a visit was made to Bamboo Key in January and again in October and the following is a brief report on the mosquito conditions existing there.

In July 1923, Dr. Howard received another letter regarding Bamboo Key from a Mr. S. C. Singleton of Miami, Florida. He wrote as follows: "There is a small island called Bamboo Key, about a half mile north of Key Vaca, and about midway of its length, that is immune from mosquitoes. I am aware of the fact that this will sound a bit like a crank story, but if you wish, what I say can be supported by affidavits from others. I took up a homestead on Ramrod Key; I am not talking hearsay. If what I say is so, then few matters are better worth your attention.

Right now, when from here to Key West, the mosquitoes are plain hell, and swarminng in the cockpit and cabin of your boat, you can anchor close to this island and they will leave your boat and you can be out on the sand in your bathing suit, in comfort.

Once when sheep were pastured there, the immunity disappeared. Some time after the sheep were taken away, the Key became again immune. This is the reason why I think it is a problem coming under the jurisdiction of the Bureau of Plant Industry.

If it is a plant that can be propagated, then oil or gold deposits would not add as much to the wealth of this State as the application of the knowledge of this fact. I am not able to undertake a proper investigation. I would be very glad to give you every aid within my power. It is not a matter of especial bleakness. Mangrove grows along this shore. Mosquitoes are not in this mangrove. This condition has been known to exist for at least twenty years. I trust you will investigate."

Topography of Bamboo Key, Florida

Bamboo Key is a small island, about three acres in area, situated among the lower Florida Keys, approximately a half mile north of Key Vaca and about midway its length. No elevations of consequence occur, the highest point being about a foot above the water's edge. The south, east, and west shores are rocky, consisting of coral. The north shore is not as rocky and a little sand beach is to be found. For the most part the key is of a shell and coral formation. Low depressions and swampy places to afford breeding places for mosquitoes do not exist about the key, except for a few small crab holes along the shore. The writer was unable to find brackish or fresh water existing on any portion of the key during either visit there and conditions about the key were exceedingly dry.

Flora of Bamboo Key, Florida

For the most part the key is devoid of trees. The few trees that do occur are close to the water's edge, and are situated on the east and south shore, while the remainder of the key is overgrown with low growing plants and shrubs of various kinds. The trees are mainly the white mangrove or buttonwood *Laguncularia racemosa* (L.) Gaertn. and the red mangrove, *Rhizophora mangle* L. One or two Geiger trees, *Sebestin Sebestina* L., occur and a single coconut stands on the southwest portion of the key. The writer was told that Bamboo Key was a bird roost at one time, and, if so, there apparently were more trees on the key than exist now. From reports the key was cleared and cultivated a number of years ago and parties resided there. The dwelling, however, was apparently destroyed by fire, parts of the foundation still remaining. The fact that this key was at one time cleared and cultivated apparently accounts for the lack of more trees, the mangrove occurring along the shore springing up after the key was abandoned.

During the second visit to Bamboo Key the writer had the use of a boat generously furnished by Mr. Hugh Matheson who owns Lignum Vitae Key and also a large portion of Upper Mathecombe Key where he operates a lime plantation. Capt. L. Cochron, Mr. Matheson's superintendent on Upper Mathecombe Key, took the writer to Bamboo Key. Capt. Cochron, who has lived on the Florida Keys for a number of years, stated after the survey of the key that he did not see a single plant growing there that does not occur on Upper Mathecombe Key or on some of the other keys. The writer made a careful collection of all plants growing on the key which have been determined by Dr. John Small of the New York Botanical Garden. The determinations are as follows: *Aloe* sp.; *Gayoides crispum* L.; *Cyperus brunneus* SW.; *Rondia aculeata* L.; *Spartina junciformis* E. & G.; *Galactia spiciformis* T. & G.; *Dolichus minimus; Atriplex cristata* HBK; *Heliotropium curassavicum* L.; *Suriana maritima* L.; Wild *asparagus; Chamaesyce buxifolia* Lam.; *Rivina humilis* L.; *Melanthera testator; Heliotropium parviflorum* L.; *Salicornia ambigua* M.; *Laguncularia racemosa* L.; *Monanthochloe littoralis* E.; *Waltheria americana* L.; *Distichlis spictata; Dondia linearis* M.; *Lyolina clostus; Gyssipum lersutum* and *Rliloxerus vermicularis.* From the data contained in Dr. Small's volume on the Flora of the Florida Keys, it appears that all the plants collected are also growing on other Florida Keys. The writer has also observed many of them growing on Grassy Key, Long Key, Lignum Vitae Key, and Upper Mathecombe Key.

Mosquito Conditions of Bamboo Key, Florida

Dr. Raymond Turck and the writer did not find any mosquitoes on Bamboo Key during the visit there in January 1923. January is not the month to find mosquitoes there, in fact, anywhere in southern Florida. On the writer's second visit to the key in company with Capt. L. Cochron, many specimens of *Aedes taeniorhynchus*, the brackish water mosquito, were collected. This was the only species of mosquito encountered on the key. Mosquitoes were not present on the boat while approaching the key from the north, but the minute we reached shore by means of a smaller boat carried with us, we were attacked. The writer's first impression on landing was not in the least encouraging; that, as reports had led him to believe, he would possibly find a solution for combatting the brackish water mosquito in Florida. He was not, however, greatly surprised when he did find plenty of mosquitoes there. The writer surveyed the entire key and stirred up mosquitoes wherever he went. In the mangrove the mosquitoes were quite plentiful, and in walking through the grass and shrubs, mosquitoes were encountered. These observations were made on October 5, the day being bright and quite warm. No doubt the mosquitoes would have been more numerous during the night. It is the writer's belief that mosquitoes do not occur in as large numbers on Bamboo Key as on Key Vaca or Grassy Key as well as some of the other keys in the vicinity. Bamboo Key is more or less wind swept. The vegetation is not as dense nor as high and hence does not afford nearly the harboring conditions for mosquitoes as the other keys which are covered with a much denser growth of mangrove and high growing trees and shrubs. Again mosquitoes were not found breeding on the key as they were on the other neighboring keys. It appeared that the mosquitoes occurring on the key migrated there from adjoining keys to the south and southeast, the prevailing winds aiding their migration from those directions. Bamboo Key might have been free from mosquitoes at one time but this is not true at present. It may be possible, however, that Bamboo Key is comparatively free from mosquitoes for very short periods during the summer months when mosquitoes are plentiful on some of the other keys. This would perhaps depend on the weather conditions at the time, and whether the wind was in a direction very unfavorable for their migration to the key.

PERSONALS

Dr. W. S. Blatchley has, at the invitation of the Florida State Federation of Women's Clubs which owns the park, undertaken a natural history survey of Royal Palm Park (Paradise Key), south of Miami. Dr. Blatchley expects to devote a considerable part of his time for at least five years to this survey.

Dr. Cole has been secured to assist Mr. Yothers in the U. S. Bur. Ent. Laboratory at Orlando.

Mr. Homer Bratley, Assistant in Department of Biology in the University, has been employed during the summer by the Department of Entomology of the Experiment Station. He assisted with the experiments on nematode control. During the remainder of the year he will serve as a half-time assistant in the Department and will work on pecan insects.

Profs. Rogers and Hubbell of the Department of Zoology of the University spent their summer vacations collecting in West Florida, Michigan, and Eastern Tennessee.

Mr. F. F. Bibby has accepted a position with the Georgia State Board of Entomology with Mr. Jeff Chaffin.

According to Science, Dr. Frank E. A. Thone, assistant professor of Botany at the University last year, has been selected to direct the "Daily Science News Bulletin" which Science Service furnishes to newspapers.

THYSANOPTERA OF N. A.

Additions and a Correction

J. R. WATSON

The writer has recently received from Prof. Harry S. Smith of California specimens of a thrips infesting lily bulbs in Los Angeles Co., Cal. The insect proved to be *Liothrips vaneeckei* Priesner, hitherto known only from Europe.

Another addition to the American species of *Liothrips* is *L. urichi* Karny ("A New Liothrips from Trinidad," Ann. Mag. Nat. Hist., 9. XII.)

The late Prof. R. C. Treherne in the Canadian Entomologist records the following new species from B. C.: *Thrips physapus* L.; *Taeniothrips lemanis Treherne, T. vulgatissimus* Hal. var. *meridionalis* Pries., *T. pallipennis* Uzel, *T. orionis Treherne,* and *Frankliniella nubila* Treherne.

An examination of a larger series of the author's Phloeothrips drakei reveals that it is identical with *Acanthothrips karnyi* Hood.

Dr. H. Priesner of Austria recently called the writer's attention to the fact that his *Dictyothrips floridensis* is an *Echinothrips.* Comparison with Morgan's *E. americana* shows that they are apparently identical.

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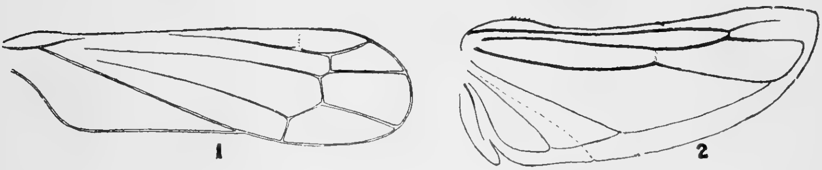
NOTES ON EUPTERYGID LEAF-HOPPERS WITH DESCRIPTIONS OF A FEW FORMS (HOMOPTERA)

By W. L. McATEE



1.—Forewing; 2.—hindwing, of *Joruma pisca.*

The following notes on distribution extend the known ranges of the forms mentioned, and the names of host plants are given wherever possible. Nothing has been published on several of these forms since their original description so the information should be welcome. A genus, two species, and four varieties are described as new. For economy the following abbreviations are used in citing two of the localities: Onaga for Onaga, Kansas, January 6, 1921, French Creek, under leaves, F. F. Clevecoeur; and Perry, for Camp Perry, Ohio, September 5, 1921, W. L. McAtee. All leaf-hoppers with latter citation were collected along the shore of Lake Erie on wild grape which they had thoroughly riddled.

Genus **Alebra** Fieber

A. albostriella var. *albostriella* Fallen.—Woodstock, Vt., A. P. Morse.

A. albostriella var. *discicollis* Herrich-Schaffer.—Falls Church, Va., June 6, N. Banks.

A. bicincta DeLong.—DuBois, Ill., August 9, 1917, J. R. Malloch.

Genus **Empoasca** Walsh

E. trifasciata Gillette.—Falls Church, Va., June 7, N. Banks.

E. albolinea Gillette.—Indianola, Nebraska, July 5; Cambridge, Mass., July, on maple.

Joruma new genus

This genus is intermediate in character between the two main groups of Eupterygidae that lack an appendix to the hemelytron. These groups have been distinguished by the characters: wing with, and without submarginal vein, respectively. A clearer way of expressing the same thought is apical cells of the wing closed, and the alternative, apical cells of the wing open. The present genus has one open and one closed apical cell in the wing. Venation of tegmen and wing as in Figures 1-2 (kindly drawn by J. R. Malloch). Another character of note is that the ocelli are so well developed that they may justly be called conspicuous for this small leafhopper; they are on the rondure from vertex to front, at about their own diameters from inner margins of eyes.

Other features of this insect probably of generic significance are the following. The cross-vein that would form base of first apical cell of tegmen is nearly obsolete. There is a row of coarse punctures extending about one-third of way across pronotum in front of each humeral angle and there is a nearly percurrent median impressed line on the vertex.

The genus is named for John Russell Malloch who is equally acute and successful in collecting as he is in the taxonomy of insects.

Genotype the following species:

Joruma pisca new species

Head and thorax dark brown above appearing as if underlaid by reddish; tegmina uniformly fumose with dark greenish reflections; most of face and legs pale yellow, the upper part of front and anterior part of vertex, more or less reddish, sometimes paler just around ocelli; abdomen chiefly brown above and pale yellow below with edgings of the alternate color; pleural regions more or less reddish. Length: 3 mm.

Holotype ♀, Plummers Id., Md., August 27, 1922, J. R. Malloch; allotype, Glen Echo, Md., August 22, 1922, W. L. McAtee; paratype ♀, Glen Echo, Md., July 23, 1922, J. R. Malloch. A female from San Domingo, W. I., 6.8.05, August Busck (U. S. Nat. Mus.), seen only after the preceding account was in ms. is made a paratype. Another specimen in too poor condition to be included in the type material is from La Ceiba, Honduras, Aug. 17, 1916, F. J. Dyer. (U. S. N. M.)

Joruma adusta new species

Another specimen of this genus recently found represents a species distinct from the genotype. It agrees exactly with the generic characters as already defined, and in the main is colored like the genotype. Reddish tints are almost absent, however, and the front of vertex between ocelli and middle of face are covered by a broad dusky band. This species is also longer and broader than *pisca;* the vertex is more rounded, its median length scarcely greater than that along inner margin of eye, while in *pisca* the vertex is more produced, the median length being decidedly more than that along inner margin of eye. Length 3.5 mm. Holotype ♀, Chapada, Brazil, January, C. F. Baker, (U. S. Nat. Mus.)

Genus **Eupteryx** Curtis

E. artemisiae Kirchbaum.—Arnold arboretum, Boston, Mass., swept from *Artemisia* sp., July 27, 1921, Harold Morrison. This species has not previously been recorded from the United States.

E. flavoscuta var. *flavoscuta* Gillette.—Beltsville, Md., May 21, 1922; Glen Echo, Md., August 8, 28, 1921; May 14, September 17, 1922; Chain Bridge, Va., September 11, 18, 1921, J. R. Malloch. This species lives on ferns.

E. flavoscuta var. *nigra* Osborn.—Beltsville, Md., May 21, 1922; Glen Echo, Md., August 8, 28, 1921; May 14, 21, 26, J. R. Malloch; August 22, 1922, J. R. Malloch, W. L. McAtee.

E. flavoscuta var. *juvenis* McAtee.—Glen Echo, Md., July 23, 1921, J. R. Malloch.

Genus **Hymetta** McAtee

H. trifasciata var. *trifasciata* Say.—Onaga.

H. trifasciata var. *balteata* McAtee.—Cold Spring Harbor, N. Y., August 10, 1922, swarming on *Hedera helix* which the hoppers had severely injured, W. L. McAtee; Dallas, Tex., August 21, 1922, on cultivated grape, F. C. Bishopp; Ames, Iowa, various dates, April to September.

Genus **Erythroneura** Fitch

E. vulnerata var. *vulnerata* Fitch, fulvous form.—Perry; Vermillion, Ohio, July 21, 1921, on Delaware grape, C. I. Bliss; red form: St. Louis, Mo., on elm, T. Pergande.

E. vulnerata var. *niger* Gillette.—Onaga.

Erythroneura hubbardi new species

This species has a very distinct type of coloration from any previously described American form, and suggests very strongly in this respect some of the European species of Eupteryx. The scutellum and parts anterior are sooty fuscous (the eyes somewhat reddish); the tegmen is pale yellow, with the extreme base of clavus sooty and a fuscous mark beginning at apical third of clavus, skirting costal plaque and covering remainder of the surface posteriorly except for the following clear areoles: a small one on radial margin in apex of clavus; a larger one in the end of each sectorial area; the extremely large first apical cell almost entirely; three small round spots in second apical cell, two of them on margin, one at exterior angle; three large and two small spots in basal two-thirds of third apical cell, and the apex of this cell; a large spot basally, connecting with radial margin in fourth apical cell and two small round spots toward the apex. Moderately wide margin of pronotum and head as seen from below sooty brown, a narrow line between eyes, and remainder of lower parts, including legs, but excluding the sooty brown genitalia, pale yellow. Venation of tegmen of the *vulnerata* type; vertex longer than wide between the eyes, blunt. Length: 2.75 mm. Holotype ♀, Chiricahua Mts., Ariz., June 9, H. G. Hubbard (U. S. Nat. Mus.)

E. obliqua var. *obliqua* Say, red form.—Washington, D. C., November 3, 1895, on oak, T. Pergande; yellow form: Sea Cliff, N. Y., N. Banks.

E. obliqua var. *electa* McAtee.—Falls Church, Va., March 28, N. Banks.

E. obliqua var. *eluta* McAtee.—Glen Echo, Md., August 22, 1922, W. L. McAtee.

Erythroneura erosa new species

Venation resembles that of *obliqua* Say. In two specimens examined a vitta covering more or less of vertex, middle part of pronotum and most of scutellum; differs considerably in details; in one specimen this vitta is sanguineous (nearly orange on posterior part of pronotum), is underlaid by dark stripes along inner margins of eyes, and by three pairs of dusky spots, one pair near front of vertex, a pair of smaller ones just behind, and a pair larger than either of the others near front of pronotum. In the other specimen the vertex is yellow, with only the anterior pair of spots and median line posteriorly dusky, posterior disk reddish; front of pronotum dusky, two large discal spots scarlet; anterior disk and extreme lateral angles of scutellum and margins of pronotum pale yellow; ground color of tegmina greenish yellow, clavus with two large oblong blotches on basal two-thirds, and corium with a single similar blotch exterior to hind part of clavus, and another just posterior, coral-red (glossy spectrum red in one specimen). All of these spots have their edges ragged or erose. Apical cells, apex of clavus, and hind part of costal plaque dusky fumose; a band of coral-red spots over cross veins in one specimen. Length 3 mm.

Holotype ♀, Los Angeles Co., Calif., D. W. Coquillett (U. S. Nat. Mus.); paratype ♀, Spreckels, Calif., Sept. 10, 1907, E. D. Ball (Ball).

E. tecta var. *tecta* McAtee.—Glen Echo, Md., August 28, 1821, J. R. Malloch; New Hampshire, F. Blanchard.

E. tecta var. *carbonata* McAtee.—Glen Echo, Md., July 16, August 22, 1922; Chain Bridge, Va., September 10, 1922, J. R. Malloch; Middlesex Fells, Mass., August 28, August 29, N. Banks; New Hampshire, F. Blanchard.

Erythroneura abolla var. divisa new variety

General color above sulphur-yellow, hind margin and a median longitudinal line on vertex, disk of pronotum, scutellum, and commissure broadly dusky to black, a coloration reinforced by the dark dorsum of abdomen; membrane as well as ends of the cells between sectors dusky hyaline. General color below sulphur-yellow, legs stramineous. Length 2.75 mm. Holotype male, Glen Echo, Md., July 16, 1922, J. R. Malloch.

E. tecta var. *tecta* McAtee.—Glen Echo, Md., August 28, 1821, J. R. Malloch; New Hampshire, F. Blanchard.

E. tecta var. *carbonata* McAtee.—Glen Echo, Md., July 16, August 22, 1922; Chain Bridge, Va., September 10, 1922, J. R. Malloch; Middlesex Fells, Mass., August 28, August 29, N. Banks; New Hampshire, F. Blanchard.

E. aclys McAtee.—Glen Echo, Md., August 21, 1921, April 23, July 9, 30, 1922, July 1, 1923; Virginia near Plummers Id., Md., August 27, 1922, J. R. Malloch; Kingston, N. J., August 20, 1923, on redbud, H. B. Weiss.

E. morgani Delong, red and yellow forms.—Chain Bridge, Va., April 16, 23, May 7, August 20, September 17, 1922, April 23, 1923, J. R. Malloch.

E. basilaris var. *basilaris* Say, red form.—New Hampshire, F. Blanchard.

E. basilaris var. *affinis* Fitch.—Onaga; Falls Church, Va., April 7, N. Banks.

E. maculata var. *maculata* Gillette, red and yellow forms.—Sandusky, Ohio, August 16, 1921, on sycamore, C. I. Bliss; Perry; red form only: Washington, D. C., November 3, 1895, on oak, T. Pergande; Sea Cliff, N. Y., August; Cambridge, Mass., October 10, N. Banks.

E. maculata var. *bella* McAtee, yellow form.—Glen Echo, Md., August 22, 1922, J. R. Malloch.

E. maculata var. *osborni* De Long.—Chain Bridge, Va., September 11, 1921, April 23, 1923; Glen Echo, Md., August 22, 1922, August 10, 1923, J. R. Malloch.

E. maculata var. *bigemina* McAtee.—Onaga.

E. maculata var. *gemina* McAtee.—Glen Echo, Md., July 4, Aug. 28, 1921, J. R. Malloch.

Erythroneura maculata var. confirmata new variety

Markings of head, thorax and scutellum as usual in the *maculata* type, yellow; tegmen with a streak along claval suture anteriorly, an oblique dash at base of corium and another at anterior end of costal plaque, yellow; dot at posterior end of plaque, and in base of fourth apical cell black; and the following markings red, broad vitta based on costal plaque, extending inwardly and crossing clavus as an oblique broad band, and a straight narrow stripe, connected narrowly behind to a spot which spreads so as to fill spaces between sectors anterior to third and fourth apical cells, also ramose marking on cross veins; costal plaque dusky bluish hyaline, apical cells fumose. Color below pale yellow. Length: 2.75 mm.

Holotype, and paratype males, Chain Bridge, Va., April 23, 1922, J. R. Malloch.

Erythroneura maculata var. **parallela** new variety

Bears the same relation to *maculata* that var. *rubra* Gillette does to *comes*, the red markings being more extensive and denser than in the typical variety, of a darker shade of red, and the dorsum of abdomen very dark. Length: 2.5 mm.

Holotype male, Lexington, Mass., Sept. 28, 1920; paratype male, same locality, Sept. 18, 1920, and Arlington, Mass., Oct. 9, 1920. Specimens intermediate between this and the typical variety were collected at Lexington at approximate dates.

E. ligata var. *ligata* McAtee. Perry.

E. vitis var. *vitis* Harris.—Dallas, Tex., August 21, 1922, on cultivated grape, F. C. Bishopp; Washington, D. C., October, 1895, on *Cercis canadensis*, T. pergande; Perry; Ottawa County, Ohio, September 4, 1921, on *Vitis vulpina*, C. I. Bliss.

E. vitis var. *bistrata* McAtee.—Fort Washington, Pa., September 24, 1921, H. L. Viereck.

E. vitis var. *stricta* McAtee.—Perry.

E. tricincta var. *tricincta* Fitch, yellow form.—Kelley's Id., Ohio, July 30, 1920, on Clinton grapes; Put-in-Bay, Ohio, August 3, 1920, on Catawba grape, C. I. Bliss; Perry.

E. tricincta var. *calycula* McAtee, yellow form.—Chain Bridge, Va., September 11, 1921, May 7, 1922, J. R. Malloch.

E. tricincta var. *integra* McAtee, yellow form.—Chain Bridge, Va., October 2, 1921, April 23, 1922, J. R. Malloch.

E. comes var. *comes* Say, red and yellow forms.—Rocky River, Ohio, September 1, 1920, on Catawba grape, C. I. Bliss; yellow form only; Black Mt., N. C., May, N. Banks.

E. comes var. *vitifex Fitch*, red form.—Dallas, Tex., Aug. 21, 1922, on cultivated grape, F. C. Bishopp; Colorado (No. 1854).

E. comes var. *elegans* McAtee.—Cambridge, Mass., October 3, November 1; Lexington, Mass., September 7.

E. comes var. *rubra* Gillette.—Perry.

E. comes var. *rubrella* McAtee.—Onaga; Sea Cliff, N. Y., N. Banks.

E. comes var. *delicata* McAtee, red form.—Falls Church, Va., March 26, N. Banks; Chain Bridge, Va., April 16, 23, 1922, J. R. Malloch.

E. comes var. *accepta* McAtee, yellow form.—Chain Bridge, Va., May 7, 1922, J. R. Malloch.

E. comes var. *compta* McAtee, yellow and red forms.—Middle Bass Id., Ohio, August 10, 1920, on Catawba grape, C. I. Bliss.

E. comes var. *ziczac* Walsh, red and yellow forms.—North Bass Id., Ohio, August 6, 1920, on Clinton grape, C. I. Bliss; red form only; Perry; Wichita, Kans., August 31, 1918, on English ivy, J. R. Horton.

Erythroneura comes var. **bidens** new variety

Like *E. comes* var. *rubra* Gillete, except that the upper surface of pronotum save a semi-elliptical space on each anterior angle, and a semicircular spot in middle of front margin, is black. Length 2.8 mm. Holotype male, Virginia near Stubblefield Fall, on *Pinus virginiana*, October 23, 1921, J. R. Malloch.

Erythroneura comes var. **suffusa** new variety

What is left of the ground color is pale yellow, but the vertex has a median dusky vitta, flanked at its apex by dark parentheses; the pronotum has the hind margin and much of disk dusky to black; the scutellum with a short median vitta from base, or more of basal part, dusky to black; and the tegmen except for costa is dusky fumose; in best marked individuals the usual black markings of *comes* are distinct and colored markings typically indistinct; color below also chiefly dark, middle of face, legs, and abdominal edgings paler. Length: 2.75-3 mm.

Holotype male Glen Echo, Md., July 16, 1922, J. R. Malloch; paratypes both sexes, same locality, July 10, 17, 23, August 8, 1921, and May 26, 1923, J. R. Malloch; August 22, 1922, W. L. McAtee.

THE CHRYSOMELIDAE OF FLORIDA

By W. S. BLATCHLEY
Dunedin, Florida

(Continued from page 23)

*209 (16015). C. **crenulata** Cr.—"Sumter Co., very rare" (Sz.). At hand from Gainesville; taken by Watson in June by beating in flat-woods.

*210 (16016). C. **confinis** Cr.—Throughout the State, south to Ft. Myers and Moore Haven. At hand from four stations and recorded from numerous others. Common about Dunedin, Nov.-Apr. on soy-beans, Convolvulaceae and other vegetation, especially in low mucky grounds. Gainesville, abundant, Mch.-Apr., in the hammocks on basswood, wild cherry, buckeye, etc. (Doz.); velvet beans, Nov.; oak, Apr.; maple, June (Wat.). In the North known as the "sweet potato flea-beetle."

*211 (16020). C. **quadricollis** Sz., 1878, 368.—Types from Enterprise and New Smyrna, May-June. Biscayne Bay and L. Worth (Sz. Ms.). Common in truck patches around the southern half of L. Okeechobee in March (Bl. 1923).

LIII. **Systena** Clark.

Small elongate, convex black or dull yellow glabrous species (3-5 mm.) having the thorax without basal impression, elytral punctures confused, front coxal cavities closed, spur of hind tibiae small and slender. The adults live mainly on marsh vegetation, as *Polygonum*, etc.

*212 (16023½). **S. frontalis** (Fabr.).—Northern part of State, south to Citrus Center (Davis Coll.). At hand from Gainesville and Dunedin, at the former on smartweed, July (Wat.); rare at Dunedin at porch-light, June 15. Occurs usually on *Polygonum* about the margins of ponds. Leng, in his Catalogue, forgot to number this and it appears erroneously as a synonym of *pallicornis* Schæffer, a Texas species.

213 (16026). **S. pallipes** Sz., 1878, 367.—Types from "different parts of Florida, abundant on swampy meadows in May and June" (Sz.). L. Poinsett, L. Ashley, Baldwin and Crescent City (Sz. Ms.). Ft. Myers, Apr. 20 (Davis Coll.).

*214 (16027). **S. elongata** (Fabr.).—"Enterprise, not rare" (Sz.). St. Augustine (Ham.). Moore Haven, Mch. 27, on foliage in low mucky soil. Gainesville, on *Helenium*, June (Wat.).

*215 (16029). **S. marginalis** (Ill.).—Crescent City and Haw Creek (Sz. Ms.). Dunedin, rare, Mch. 28, on wax-myrtle; July 5 at porch-light. Gainesville, on *Polymnia* and *Myrica*, June; L. Wales, on oak (Wat.).

LIV. **Longitarsus** Latreille.

Very small oblong-oval, strongly convex, glabrous species (1-2.5 mm.) blackish or dull yellow in hue and having the front coxal cavities open behind, thorax without basal impression, elytral punctures confused, hind tibiae with apex entire, first joint of hind tarsus nearly half the length of tibia. (For key to species see Bl., 1921). The adults live mainly on subaquatic vegetation along the edges of marshes or on herbage in dense woodland.

216 (16032). **L. varicornis** Suffr.—Leng, in his catalogue, mentions *L. heliophyti* Horn, a synonym, as occurring in Florida, Alabama and Texas. No other State record. Occurs on the Indian heliotrope, *Heliotropium indicum* L.

*217 (16046). **L. pygmaeus** Horn.—"Enterprise, Tampa, Baldwin and Sumter County" (Sz. Ms.). At hand from Arch Creek and Dunedin. Frequent about Dunedin, Dec.-Apr., on tall dead grasses along the margins of ponds. Described from Georgia.

218 (16047). **L. testaceus** Melsh.—Northern part of the State south to L. Okeechobee (Davis Coll.). Numerous records by Schwarz (Ms.) and others but part of them doubtless refer to *L. cotulus* and *tenuicornis*.

*219 (——). **L. tenuicornis** Blatch., 1923, 34.—Types from Sanford, Dunedin, La Belle, Moore Haven and Ft. Myers, Nov. 21-Apr. 4. Common on low vegetation about the borders of ponds and lakes and at Dunedin on the fleshy crucifer, *Cakile edentula* (Bigel), along the bay front.

*220 (16048). **L. cotulus** Blatch., 1914, 141.—Types from Kissimmee, Dunedin, Eustis and Sanford. Occurs throughout the State, south to Moore Haven, on May weed or dog-fennel, *Anthemis cotula* L. and allied Compositæ. Gainesville, May-Dec., on *Eupatorium*, *Cephalanthus*, velvet beans, chinquapin, etc." (Wat.).

221 (16049). **L. melanurus** Melsh.—Lake Harney (Sz. Ms.). Crescent City (Wic.). Horn gives North Carolina as its southern range.

*222 (——). **L. fuscicornis** Blatch., 1919, 65.—Types from Dunedin, Oct. 26-Dec. 13, where it occurs on low vegetation about ponds. No other record.

*223 (16052). **L. perforatus** Horn, 1889, 286.—Types from Tampa. Frequent about Dunedin, Feb.-Apr., on tall dead grasses about the margins of "wet-weather" ponds.

*224 (——). **L. impuncticollis** Blatch., 1923, 35.—Types from Dunedin, Feb. 28, swept from vegetation about the margin of a pond.

*225 (16053). **L. solidaginis** Horn, 1889, 286.—Types from Sumter County on a species of *Solidago*. Orange County (Sz. Ms.). Frequent about Dunedin, Jan.-Apr., on huckleberry and other low shrubs in open pine woods and about the margins of hammocks. Hibernates beneath pine bark and in Spanish moss.

*226 (——). **L. subcylindricus** Blatch., 1920, 70.—Type from Dunedin Mch. 27; taken by beating in dense hammock.

*227 (——). **L. aeneola** Blatch., 1923, 35.—Type from Caxambus, Mch. 6; swept from low herbage along the margin of a salt water lagoon.

LV. **Glyptina** Leconte.

Small oblong-oval species (1.5-3.5 mm.), closely allied to *Longitarsus* but having the elytra blue or dull yellow, their punctures in rows, first joint of hind tarsus not more than one-third the length of tibia.

228 (16056). **G. bicolor** Horn.—Biscayne Bay, Slosson collection, Jan.-Mch. (Leng Ms.). No other State record.

229 (16058). **G. cyanipennis** Cr.—Biscayne Bay (Horn, 1889). No other State record. Occurs in Indiana on the Virginia-creeper, *Parthenocissus quinquefolia* (L.).

230 (16060). **G. brunnea** Horn.—Tampa and L. Ashley (Sz. Ms.).

*231 (16061). **G. spuria** Lec.—"Enterprise, rare" (Sz.); Tampa, Haw Creek and Punta Gorda (Sz. Ms.). Cape Sable, Feb. 27; one specimen taken by beating in hammock.

232 (16062). **G. cerina** Lec.—"Tampa very rare" (Sz.). St. Augustine (Ham.). Probably an error of identification.

LVI. **Phyllotreta** Foudras.

Small oblong-oval, subconvex species (2-3 mm.) allied to *Glyptina* and having the elytra blue, or piceous with pale stripes or spots, their punctures confused; hind tibiae not grooved, the spur at middle of tip. The adults feed on cruciferous plants both wild and cultivated.

*233 (16066). **P. vittata** (Fabr.).—Enterprise Apr. 17 (C. & L.). Jacksonville (Sz. Ms.). Sanford and Dunedin, rare, Apr. 4-26 sweeping in low moist gardens. Known as the "cabbage flea-beetle," the adults feeding upon the leaves of turnips, cabbage and strawberries, the larvae on the roots.

234 (16076). **P. chalybeipennis** (Cr.).—"Occurs on the sea coast, Massachusetts to Florida" (Horn, 1889). No other State record. A submaritime species feeding on the sea rocket, *Cakile edentula* (Bigel).

*235 (16081). **P. picta** (Say.).—Northern two-thirds of the State, south to Tampa. At hand from Ormond, Apr. 15, beaten from oak. Gainesville, very abundant on young oak foliage, Mch.-Apr. (Doz.).

*236 (——). **P. liebecki** Schæffer, 1919, 339.—Types from Enterprise. Sanford, Mch. 28—Apr. 9; taken in numbers by sweeping herbage along the borders of cypress swamps. This is the species erroneously recorded by me (1914, 142) as *P. robusta* Horn (See Bl., 1920a, 263).

LVII. **Aphthona** Chevrolat.

Very small oval, convex, glabrous species (2-2.5 mm.) having the elytra blue or reddish-yellow, their punctures confused, hind tibiae with the inner apex notched or bilobed, the spur on inner lobe.

237 (16084). **A. insolita** (Melsh.).—Capron, "very rare" (Sz.). Miami (Kn.). Occurs in Southern Indiana on the Indian currant, *Symphoricarpos.*

LVIII. **Psylliodes** Latreille.

Small oblong-oval convex glabrous (2-2.5 mm.) piceous bronzed or bluish-green species having the antennae 10-jointed; front coxal cavities closed behind, hind tarsi inserted on the outer side of the tibiae above the apex; elytral punctures in rows.

238 (16089). **P. punctulata** Melsh.—St. Augustine (Ham.). The only State record.

*239 (16090). **P. convexior** Lec.—"Occurs in Texas, Georgia, Florida, etc." (Horn, 1889). At hand from Gainesville; taken by Watson March 10 on radish. No other State record.

*240 (16093). **P. elegans** Horn, 1889, 311.—Types from Florida and Kansas. Haulover, Enterprise and Cedar Keys (Sz.). as *P. lacustris;* changed (Ms.) to *P. elegans.* At hand from Ormond, Caxambus and several intervening stations. Frequent about Dunedin, Jan.—Apr., especially so on the field sorrel, *Rumex acetosella* L., in sandy cultivated grounds, and the fleshy sea-rocket along the bay beach.

LIX. **Stenispa** Baly.

Elongate, subcylindrical black or bluish-black species of medium size (5-7 mm.) having the head inserted in thorax to eyes, its front inflexed, the mouth inferior; thorax as broad as elytra, the latter not costate but with finely punctate striae; tarsal claws widely divaricate. This and the genera with costate elytra up to LXVI, comprise the subfamily *Hispinae.*

*241 (16094). **S. metallica** (Fabr.).—"Enterprise and Tampa, not rare" (Sz.). Haw Creek (Sz. Ms.). Scarce at Dunedin, Feb.-Mch., on low huckleberry and on grasses about the margins of ponds.

LX. **Anisostena** Weise.

Small elongate bluish-black species (4-5 mm.) having the antennae filiform, 11-jointed, elytra costate, middle tibiae curved, third joint of tarsus bilobed, tarsal claws divergent. The generic name in former use was *Charistena.*

242 (16096). **A. nigrita** (Oliv.).—"Florida" Horn Coll. (Cr.). Enterprise (C. & L.).

*243 (16102). **A. ariadne** Newm.—Scarce in the northern part of the State, south to La Belle. At hand from Sanford and Dunedin, Febr.-Apr.; taken beneath boards in damp places. Gainesville, July (Wat.). LaBelle Apr. (Kn.).

244 (16103). **A. lecontei** Baly.—"Florida, rare." (Horn, 1883). St. Augustine (Ham.).

LXI. **Anoplitis** Chapuis.

Small elongate-oval species (3.5-4 mm.) ; dull red, often marked with fuscous; antennae 11-jointed, elytra costate, with eight rows of punctures, middle tibiae straight. Formerly listed as *Odontota* or *Chalepus.*

*245 (16105). **A. inæqualis** (Web.).—"Lake Harney and Enterprise, rare" (Sz.). as *O. rosea* Web.; changed to *nervosa (=inaequalis)* (Sz. Ms.). Sanford (Wic.) as *nervosa.* Gainesville on *Polymnia* and *Rhus,* July (Wat.). At hand from Eustis and Dunedin, Apr.; swept from low herbage. Leng includes *A. rosea* Web. from "Fla.", but this was evidently based on the first record by Schwarz. That name is usually considered a synonym of *inaequalis,* as the species is extremely variable in color.

LXII. **Chalepus** Thunberg.

Elongate-oval species of medium size (5-7 mm.) with black elytra and thorax in part or wholly red; elytra with three costae and ten rows of punctures. Formerly listed as *Odontota.*

*246 (16109). **C. bicolor** (Oliv.).—Occurs throughout the State. At hand from six stations and reported from numerous others. Occurs in spring and summer on low herbage, usually in moist places.

*247 (16111). **C. scapularis** (Oliv.).—"Tampa, one specimen" (Sz.). Crescent City (Sz. Ms.). At hand from Sanford. Istokpoga and Dunedin, Mch.-Apr.; taken while beating in dense wet hammocks.

*248 (16112). **C. notatus** (Oliv.).—Northern three-fourths of the State, south to Miami; numerous records. At hand from Ormond, Sanford and Dunedin, Mch.-Apr.; taken with the preceding and by sweeping low herbage. Gainesville on blackberry, *Ostrya* (hop-hornbeam) and oak, Apr. (Doz.).

LXIII. **Baliosus** Weise.

Similar to *Chalepus* but elytra dull red with scattered fuscous marks and a fourth costa at base and apex.

*249 (16116). **B. rubra** (Web.).—Northern part of the State, south to Lakeland and Dunedin. At hand from five stations, Mch.-Apr.; beaten from wax-myrtle and oak. Gainesville on oak and linden, Jan.-June, mating June 11 (Doz.).

LXIV. **Octotoma** Suffrian.

Small oblong-oval species (4.5-5 mm.), dull black with thorax in part red; antennae clavate, 8-jointed; elytra with short oblique plicæ.

*250 (16124). **O. plicatula** (Fabr.).—Archer, by Kœbele (Sz. Ms.). Gainesville on buckeye and ash, Mch. 6-25 (Doz.).

LXV. **Uroplata** Baly.

Small, elongate, parallel-sided, dull black, species (3 mm.) having the antennae 8-jointed; elytra costate and with ten rows of punctures. Formerly included with *Microrhopala.*

*251 (16126). **U. porcata** (Melsh).—"Enterprise and Tampa, very rare" (Sz.). Jacksonville (Sz. Ms.). Moore Haven (Kn.). Scarce about Dunedin Jan.-Apr., on oak and low huckleberry.

LXVI. **Microrhopala** Baly.

Small oblong-oval black or dark-blue species (4.5-5 mm.), similar to *Uroplata* but the elytra with only eight rows of punctures.

*252 (16132). **M. floridana** Sz., 1878, 369.—Types from Sumter County, Enterprise, New Smyrna and Tampa. Baldwin (Sz. Ms.). Orlando (Kn.). Sanford and Dunedin, Dec.-Apr., on the hoary lupine, *Lupinus diffusus* Nutt.

*253 (16134). **M. erebus** (Newn.).—Northern part of the State, south to Ft. Myers and Marco (Davis Coll.). Numerous records. At hand from Ormond and Dunedin, Nov.-Apr., on oak, golden-rod and low herbage. Easily known by its very large elytral punctures.

LXVII. **Porphyraspis** Hope.

Small convex dark blue species (4-5 mm.). This and all the following genera have the thorax and elytra of nearly equal width, with broad expanded margins, head usually wholly concealed beneath the thorax and body elliptical or sometimes nearly circular. They comprise the subfamily *Cassidinae* and are known as "tortoise-beetles." The larvae are oval flattened prickly grubs and feed, for the most part, upon Solanaceæ and Convolvulaceæ. (See Bl., 1910, 1229).

*254 (16137). **P. cyanea** (Say).—Northern part of the State, south to Arch Creek. Occurs throughout the year on the saw palmetto, *Serenoa serrulata* (Michx.). Specimens taken along the Kissimmee River were wholly black in hue (Bl., 1914).

LXVIII. **Chelymorpha** Boheman.

Large oblong-oval, convex species (9-15 mm.), brick-red dotted with black; front margin of thorax broadly emarginate at middle; head visible from above. Both adults and larvae feed on Convolvulaceæ.

*255 (16139). **C. cassidea** (Fabr.).—Northern part of the State, south to Moore Haven. At hand from Ormond, Lakeland and Moore Haven. Hibernates in bunches of Spanish moss and feeds on morning-glory, sweet potato and wild potato, *Ipomoea pandurata* (L.).

*256 (16139d). **C. geniculata** Boh.—Marathon Key and Key West (Br.). A submaritime tropical species occurring along both the Atlantic and Gulf coasts of the southern third of the State. At hand from Long Key, Cape Sable, Key West, Sarasota and Dunedin. Food plant, the goat's-foot morning-glory, *Ipomoea pes-caprae* Sweet., a creeping plant growing along the sea beaches. In my opinion a distinct species, not a variety of *cassidea*. (See Bl., 1920, 71).

LXIX. **Eurypepla** Boheman

Large oval convex species (10 mm.) having the head concealed by the rounded front margin of pronotum; outline deeply and broadly notched between humeri and pronotum; claws simple.

257 (16140). **E. jamaicensis** (L.).—Key West (Sz. Ms.). Cutter, July 1 (Br.). A tropical species occurring on the geiger-tree, *Sebesten sebestena* (L.).

LXX. **Physonota** Boheman.

Large elongate-oval convex greenish-yellow species (10 mm.); thorax with three black dots; head and claws as in *Eurypepla*.

258 (16142). **P. unipunctate** (Say).—Haw Creek Prairie (Sz. Ms.). No other State record. Occurs on wild bergamot, *Monarda fistulosa*, wild sunflower, *Helianthus*, and kindred plants.

LXXI. **Jonthonota** Spaeth.

Oval convex species of medium size (7-8 mm.), dull red, elytra each with one to three vague dark spots.

*259 (16149) **J. nigripes** (Oliv.).—"New Jersey, Florida, Michigan, etc." (Br.). Ocala Apr. 17. Occurs in Indiana on wild morning glory and sweet potato.

LXXII. **Orectis** Spaeth.

Small circular convex species (5-6 mm.); elytra with numerous tubercles, their margins maculate. Formerly included under *Cassida*.

260 (16151). **O. callosa** (Boh.). Crescent City (Br.). Occurs on ground cherry and other Solanaceæ.

LXXIII. **Chirida** Chapuis.

Oval subdepressed species of medium size (5-6 mm.), dull yellow, elytra often maculate with blackish; antennal joints 2-4 in repose lying in a groove, joint 3 twice as long as 2.

*261 (16152). C. **guttata** (Oliv.).—"Cedar Keys, rare" (Sz.). Enterprise (C. & L.). Lakeland, May 8 (Davis Coll.). Ormond, Mch. 27, on oak (Bl. 1902.). Gainesville, on wild sweet potato (Doz.); on sweet potato, *Eupatorium* and *Ceanothus*, Apr.-Sept. (Wat.). Often listed as *C. signifera* Hbst., a synonym.

262 (16153). C. **extensa** (Boh.).—Jacksonville and Gulfport (Schf. Ms.). Differs from *guttata* in having the elytra usually immaculate and translucent at humerus.

LXXIV. **Deloyla** Chevrolat.

Rather large, broadly oval, subdepressed species (7-8 mm.), the elytra with disk brown, rugose, and bearing numerous tubercles, its margins broadly translucent at middle.

*263 (16155). D. **clavata** (Fabr.)—Lake Worth (Ham.). Enterprise (C. & L.). Eustis, Apr. 6, one specimen, beaten from oak. Gainesville, Dec.-Apr., on oak. Apparently confined to the northern half of the State. Food plants usually various species of Solanaceæ.

LXXV. **Metriona** Weise.

Species of medium size (5-7 mm.) and dull reddish-yellow in hue, having the elytra smooth, evenly convex; third joint of antennae but slightly longer than second. Food plants Convolvulaceæ. Usually listed as *Coptocycla.*

264 (16156). M. **bivittata** (Say).—DeFuniak Springs (Sz. Ms.). The only definite State record. Occurs on sweet potato and morning-glory.

*265 (16157). M. **bicolor** (Fabr.).—Throughout the State. At hand from nine stations and reported from many others. Hibernates in bunches of Spanish moss and beneath rubbish, and in spring beaten or swept from morning-glory, wild potato and various species of low herbage. Often listed as *Coptocycla aurichalcea* Fabr., a synonym.

266 (16159). M. **purpurata** (Boh.).—Gainesville on buckeye, oak and wild morning-glory, Mch.-May (Doz.). The only definite State record and perhaps refers to the next.

*267 (——). M. **ormondensis** Blatch., 1920, 71.—Type from Ormond, Apr. 13, on wild morning-glory.

LXXVI. **Coptocycla** Boheman.

Rather small oblong-oval, strongly convex species (5.5-6 mm.), uniform dull red in hue with expanded side margins of elytra strongly declivent.

*268 (16161). C. **repudiata** Suffr.—Haw Creek, Crescent City, L. Poinsett and Cocoanut Grove, May-June (Br.). Cape Sable, Feb. 23-26, from among the roots of tufts of a coarse prairie grass (Bl. 1920). Described from Cuba.

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AN ENLARGED NUMBER

In order to have the time of publication of the different volumes of the ENTOMOLOGIST coincide with the calendar year it has been decided to combine in this issue the remaining two numbers of volumes VIII. With the New Year we will begin Volume IX.

AEROPLANE DUSTING COMING

Last month a private concern carried on demonstrations in Georgia in dusting cotton fields and peach orchards from an aeroplane, with a view to signing up the farmers for the season's dusting. The demonstration is said by those who followed it closely to have been a success. Not only was the dusting cheaper, but the distribution was more uniform than that secured from machines operating from the ground.

It would seem that dusting citrus groves for rust mite should offer a particularly attractive field for aeroplane dusting. It could be applied at the optimum time. A single plane could dust all the groves in a county in a few days at most.

PERSONALS

Dr. P. H. Rolfs, who has spent the past four years in Minas Geraes, Brazil, establishing an agricultural college and experiment station at Vicosa, is back in Florida for the winter. He addressed the Phi Kappa Phi Society of the university on December 17, and it is hoped that the Entomological Society can induce him to talk on the insects of Brazil. Dr. Rolfs returns to Brazil in March.

Dr. W. S. Blatchley has returned to Florida for the winter and is now collecting in Royal Palm Park.

Mr. G. F. Moznette will leave shortly for South America where he will study the fruit fly situation.

Among our members who will attend the meetings of the A.A.A.S. in Washington the last of December are A. H. Beyer, Dr. O. F. Burger, J. C. Goodwin, T. H. Hubbell, Geo. B. Merrill, Dr. J. H. Montgomery, Dr. Wilmon Newell, F. M. O'Byrne, Prof. J. Speed Rogers, and Dr. P. H. Rolfs.

MEETINGS OF THE SOCIETY

October 29, 1924. The first meeting of the season of the Florida Entomological Society was held in Science Hall, October 29, at 4 P.M., with President Merrill in the chair, and the following members present: Bates, Berger, Beyer, Floyd, Gray, Hubbell, Merrill, Rogers, Walker, Watson. Visitors, Bratley, Nolen, Speere.

The paper of the evening by J. R. Watson, followed. His subject was "Insects of the Desert Region of New Mexico." The speaker first discussed the climatic and moisture conditions of the desert, and their relation to the insect life of the desert region. Under climate he mentioned the sudden and violent wind storms and their effect on the insects. To avoid death in the desert they dig into the soil, especially in the middle of the day. Other principal habitats are under the leaves of the yucca or Spanish Bayonet plant. During the wind storms the tenebrionid beetles hug firmly to the base of the plants until the storm ceases. In connection with the wind storms the speaker also made a brief mention of the birds such as the prairie horned lark and the road runner. The former "roosts" on the ground or under the banks of arroyas.

It is characteristic of the animals of the desert not to be at all particular what they eat, and the darkling beetles even live on Russian thistle seedlings, and weed seeds. The darkling beetles in this section have no wings. On account of the severe winds they would be disadvantageous. Blister beetles are common and very large in size, and some also have inflated immovable elatra. Some Cerambicids resemble darkling beetles in being wingless and feed on cactus. Digger wasps are very common especially "velvet ants," sometimes called "cattle killers." Butterflies are very rare. The speaker stated that he took only one common species on his collecting trips. He collected an abundance of geometrids. Agricultural ants were very abundant and ciccadas were also quite common. Mosquitoes were found only within a belt of 5 miles of the Rio Grande Valley.

Moisture is very scant. The light (8 in.) rain comes during the summer months of June, July, and August. At least one fourth of an inch is necessary to produce growth of the grass.

Under Brief and Timely Notes Mr. Watson mentioned the infestation of saw flies occurring in the pine trees of the state.

Mr. Beyer mentioned millipeds as injuring citrus and pecans.

Mr. Hubbell spoke of collecting a rare species of hawkmoth larva on cypress, Isoparce cypressi.

Dec. 3. The regular meeting was held in the Biological Lecture Room of Science Hall; President Merrill in the chair. The following members were present: Beyer, Gray, Hubbell, Merrill, Walker, Watson; and the following visitors: C. O. Bratley, H. E. Bratley, Cobb, Fox, Means, Nolen, Musselwhite, Speere. H. E. Bratley, R. E. Nolen, and H. L. Speere were elected to membership.

Mr. Walker presented the paper of the evening on "A Summer's Collecting of Orthoptera in Florida." He discussed and exhibited the characteristic orthoptera of the salt marsh, sand scrub, sandy ponds, cypress ponds, low pine woods, high pine woods, flat woods, and hammock. The new species collected brings the total number for Florida to 208. Of particular interest was an undescribed grasshopper from the sand scrub. Mr. Walker described the methods used in collecting. He emphasized the fact that many species not to be found at all, or rarely, during the day could be readily taken at night.

Our Common Chiggar

Dr. H. E. Ewing in the Jl. Agric. Research, Vol. XXVI, No. 9, p. 401 (Dec. 1923), writes in "Our Common N. A. Chiggar, Its Distribution and Nomenclature." He states that the proper name is *Trombicula tlalzahuatl* (Murray). Synonyms are *Leptus (Trombicula?) similis* Hirst, *L. irritans* Riley *T. cinnabaris* Ewing. The pest extends from Long Island to Mexico and from the Atlantic to the Rocky Mountains.

ADDITIONS TO THE THYSANOPTERA OF FLORIDA—XII

J. R. WATSON

(Contribution from the Department of Entomology, Fla. Ag. Exp. Sta.)

84. **Eurythrips osborni** Hinds.

Beaten from *Eupatorium serotinum* in bloom, Oct. 1923. Near Gainesville. Previously reported from grass, Mass. (Hinds) and Tenn. (Morgan).

85. **Trichothrips marginalis** Hood and Williams.

Under rotting bark, with a good growth of fungi, of a fallen maple tree. Hog-town Creek near Gainesville. Sept. 1923. (T. H. Hubbell, Coll.) Described from Louisiana, where it was found under the bark of a willow tree.

Under bark of the same maple tree the writer in Dec. 1923 took several specimens which correspond with the describtion of *T. terminalis* Hood and Williams, described from specimens taken from a stump at Orlando. It is the writer's opinion that these two species are identical.

86. **Taeniothrips** (Physothrips) **xanthius** Williams.

Collected by Geo. B. Merrill from cynipid galls in pigeon plums sent in from Miami by Reginald Hart.

Described and known only from *Cattleya* orchids from Trinidad, W. I.

87. **Gastrothrips (?) pallidus**, n. sp.

Color of body and legs a very pale yellow flecked with conspicuous hypodermal pigment which (like the eyes) is purple by transmitted, and bright red by reflected light; antennae light gray, bases of segments 3-6 colorless, apical antennal segments and tube a darker gray. *Head* about as wide as long; cheeks decidedly bulging, abruptly rounded to the eyes and converging posteriorly, destitute of conspicuous bristles. *Eyes* rather small, diameter much less than the distance between them. *Ocelli* large, straw-colored, well separated from each other but posterior pair well separated from margins of eyes, opposite the anterior third of eyes; bordered with deep orange crescents. *Mouth-cone* long, reaching the mesosternum. Labium broadly rounded at the apex. Labrum sharp-pointed and scarcely attaining tip of labium, tip dark. *Antennae* less than twice as long as head; segment 1 very broad, especially at the base, concolorous with the head; 2, urn-shaped with a broad short pedicel, uniformly grayish; 3, subclavate, tapering uniformly to a narrow base, gray in apical third, almost colorless in basal two-thirds; 4, ovoid, darker gray in apical half or two thirds, colorless at the broad base; 5, more narrowly ovoid, basal third colorless; 6, barrel-shaped with a broad colorless pedicel; 7, sub-cylindrical, abruptly contracted to a broad base; 8, sub-conical, contracted at base; 7 and 8 uniformly dark gray. *Prothorax* distinctly shorter than the head and (including coxae) nearly twice as broad as long; each angle and also coxa bears a short but rather heavy, knobbed bristle. *Pterothorax* about as broad as prothorax, sides sharply converging posteriorly. Fore coxae slender, but little wider than the others. Fore tarsi unarmed. *Wings* well-developed, membrane almost reaching the base of the tube, barely if at all contracted in the middle but the basal fourth markedly wider; very light gray except for a median darker streak along the vein which disappears near the base and a little above the middle; sparsely fringed with rather long hairs, 3 interlocated ones on fore wing. *Abdomen* narrow at the base, widest at about segments 7 and 8; each segment provided with one or more rather thick but colorless bristles which become progressively longer posteriorly, those on segment 9 being nearly as long as the tube, blunt. *Tube* about two-thirds as long as the head, twice as wide at the base as at the apex, not abruptly contracted at the apex; terminal bristles about as long as the tube.

Measurements: Total length about 1 mm. Head, length .168 mm., width .173 mm.; prothorax, length .109 mm., width .21 mm.; mesothorax, width .224 mm.; abdomen .187 mm.; tube, length .11 mm., width at base .053 mm., at apex .028 mm.

Antennae:

Segment	1	2	3	4	5	6	7	8
Length	29	40	57	56	44	43	40	29
Width	37	27	27	27	24	21	17	13 microns

Total length .29 mm.

Described from two females found with the preceding species.

Hood's description of the genus *Gastrothrips* will have to be modified in two respects to admit this species. The tube is not abruptly contracted at the base and there are three interlocated bristles on the fore wing. In shape of head, eyes, prothorax, and mouth cone it agrees with that genus. Only the fourth antennal segment seems to bear a triangular process beneath.

88. **Haplothrips angustipennis** Wats.

Plant City, Fla. T. H. Hubbell, Coll. Described from Georgia.

89. **Microthrips piercei** Morgan.

On *Cassia siamea* at Miami, Fla. Feb. 7, 1924. W. T. Owrey, Coll.

90. **Scirtothrips owreyi** n. sp.

Color dark brown; prothorax and especially abdomen darker, head, pterothorax, all femora and antennae somewhat lighter, all tibiae, tarsi, and antennal segment 3 a much lighter yellowish brown.

Measurements: Total body length 1 mm. to 1.13 mm.; head, length 0.11 mm., width 0.18 mm.; prothorax, length 0.16 mm., width 0.22 mm.; pterothorax, length 0.18 mm., width 0.22 mm.; abdomen, width 0.36 mm.; antennae, total length 0.31 mm.

Segment	1	2	3	4	5	6	7	8
Length	26	44	58	52	48	63	13	18
Width	37	30	23	22.5	20.5	21	8	6 microns

Head rounded in front, considerably elevated between the bases of the antennae which it slightly overlaps. Vertex cross striated. A heavy black spine inward from each eye and a very long one arising from below the base of each antennae on the ventral side and two rather short ones midway of each cheek behind the eyes; cheeks arched and roughened. *Eyes* large, slightly protruding, roughly triangular in shape, facets large. Anterior ocellus large, yellow and situated about opposite the anterior margin of eyes. In one specimen the posterior ocelli are absent, in the other very conspicuous, situated at the inner-posterior corner of each eye, margined on the inner side with dark brown crescents.

Mouth cone long, reaching the mesosternum. *Antennae* 8-segmented, segments 2 and 5-8 concolorous with the head; 1, 3, and the base of 4 lighter brown. Spines dark and thick and quite conspicuous.

Prothorax a third longer than the head and nearly .4 wider than long; sides quite convex, but little wider posteriorly than anteriorly; pronotum faintly reticulate striate; one long, one rather short but thick, and one minute bristle on each anterior angle; a pair of long and one minute bristle on each posterior angle; three pairs of bristles along the anterior margin, the second of which are longer.

Sides of the very short mesothorax strongly convex and diverging posteriorly, those of the even shorter metathorax nearly straight and slightly diverging posteriorly. Two heavy spines near the anterior angles of the pterothorax and the metanotum covered with short ones like the abdomen. *Wings* entirely lacking. *Legs* rather short, the fore femora especially so, the latter with a small tooth at the apex on the inner side. Fore tibiae almost as thick as the femora, with a heavy black bristle below the apex on the inside. Tarsi unarmed. Abdomen wide and heavy, the last two segments with very long, heavy, dark bristles on the sides.

Described from two females collected from *Iris trifoliata* at Jacksonville, Fla., by Mr. W. T. Owrey of the Federal Horticultural Board.

This species resembles *Sericothrips apteris* Daniels, in color, the absence of wings, and the long mouth cone, but differs in the presence of ocelli, suture on antennal segment 6, two long bristles on the posterior angles of the prothorax, the presence of a tooth at the apex of the fore femora, and in the shorter head.

91. **Chirothrips floridensis catchingsi** Wats.
Under the leaf sheaths of Napier grass, Gainesville, Dec. 1924.
Previously described from Louisiana (Bull. 168, Fla. Agric. Exp. Sta.)

The Third International Congress of Entomology will be held at Zurich, Switzerland, July 19th to 26th, 1925, with Dr. A. V. Schulthess as president. General Secretary Dr. Leuzinger, Gloriastrasse 72, Zurich, 7, Switzerland. All entomologists are cordially invited. For the Executive Committee,

Henry Skinner.

The first and second congresses held at Brussels and Oxford, respectively, were very successful and it is now proposed to hold the third congress in a neutral country where entomologists of the belligerent countries could meet without embarrassment, and Switzerland has been suggested as a suitable place and attractive in many ways and convenient for the majority.

MR. WALKER GOES TO COLOMBIA

One of our members, Mr. F. W. Walker, has left for Colombia, S. Am., where he has been employed as entomologist by the United Fruit Co.

THE CELERY LEAF-TYER

The leaf-tyer *(Phlyctaenia rubigalis* Guenee), which did so much damage in the Sanford celery fields during the spring of 1924, has again appeared in large numbers in that section. Owing to the difficulty of getting any poison into the heart of the celery plant where the caterpillar works, the insect was found to be a difficult one to control. Recent trials conducted by the Experiment Station indicate that calcium arsenate blown into the plants by a good dusting machine would seem to offer the most promising means of control.

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A NEW GENUS, A NEW SUBGENUS AND SEVEN NEW SPECIES OF THYSANOPTERA FROM PORTO RICO

By

A. C. MORGAN,

Associate Entomologist, U. S. Department of Agriculture

Cercyothrips. New Genus. Family Thripidae.

Antennae 8-segmented, maxillary palpi apparently only 2-segmented, sense cones on segments 3 and 4 forked, mouth cone broad and heavy reaching nearly across prosternum. Head produced between antennae which are inserted far apart close to the eyes, and are directed somewhat laterally. Cheeks strongly converging posteriorly. Prothorax shorter than the head and without the usual spines at the angles. Anterior and intermediate tibiae unarmed; legs stout. Wings well-developed, with two veins sparsely set with spines. 9th segment of abdomen the longest. Spine on abdominal segments 9 and 10 stout.

This genus suggests *Limothrips* somewhat in the projection of the head between the eyes. The antennae are very similar to those of some species of *Sericothrips*, notably *variabilis*.

Cercyothrips striatus. New Species.

Female:—Measurements of Holotype: Length 0.95 mm.; head, length 0.112 mm., width through eyes 0.163 mm.; prothorax, length 0.103 mm., width 0.155 mm.; mesothorax, width 0.20 mm.; abdomen, greatest width 0.215 mm.

Dimensions of antennal segments in microns:

	1	2	3	4	5	6	7	8
Length	22	36	60	61	49	53	12	18
Width	28	28	20	18	16	15	7	6

General color by reflected light: eyes deep orange, whole body, especially prothorax, heavily tinged with orange, also all femora and tibiae and two basal segments of antennae and segment 6, basal half of segments

3-5, segments 7-8 and tarsi lemon yellow. Color by transmitted light; head, thorax, abdomen, femora, tibiae, and segment 2 of antennae deep brown; tarsi, distal half of segments 3, 4, 5 and segments 6-8 light brown, 7 and 8 lighter than 6, proximal half of segments 3 to 5 gray brown. Wings clear in basal 2/5 and distal 1/5 except over veins, remainder brown, forming a broad band. Posterior wings clear except for dark brown median vein.

Head nearly straight across front to middle of insertion of antennae, thence curving forward very nearly to base of second antennal segment forming a projection between the antennae as broad as basal segment. Eyes not protruding, rather coarsely facetted, minutely pilose, occupying slightly more than half the width of the head and 2/3 its length; with orange pigmentation. Ocelli large, approximate, the posterior pair opposite center of eyes, slightly fore-shortened due to their position on sides of hump, anterior ocellus on front margin of hump and strongly directed forward. Cheeks slightly roughened and converging evenly and strongly to prothorax. Dorsal surface behind ocelli very distinctly though finely transversely striate, and very slightly so in front of anterior ocellus. Spines upon head sparse and minute. Antennae situated rather low on front bearing few spines and those small. Branched sense cones placed as in Frankliniella, but in this specimen they are much enlarged and long. A long transparent sensory hair located on inner margin of six near the middle.

Prothorax very distinctly though finely transversely striate, anterior angles broadly rounding to the middle of the segment, posterior angles slightly rounding, without long spines, although rather low down on each anterior angle, and on posterior angles a single very short spine is visible, remnants of the row on the posterior margin are found in a pair of very short, rather stout spines on each side of meson. Mesonotum and metanotum distinctly and finely striate. Legs short and the fore pair, particularly, quite stout. Femora and tarsi sparsely pubescent. Wings narrow, ring vein heavy, at middle about 1/15 as broad as long, spines on costa and veins small, costa bears 23, fore vein bears 9 spines situated as follows, 3 near base, 4 near middle, 1 at fourth fifth and one near tip; posterior vein bears 3 spines all beyond middle of vein, two being near the middle and the third just within brown area near fourth fifth. Anterior vein runs all the way very near costa. Fringe on costa long, slender and sparse, fringe on posterior margin long, slender and straight.

Abdomen striate on sides of first to 7th segments, constricted at segments, broadest at about 5th segment, converging evenly from 6th segment to the stout cone-shaped 10th segment. Conspicuous spines only on last three segments, two lateral pair on nine and much shorter median pair on 10 quite prominent and dark brown. The median pair on 9 considerably smaller than those on 10. 8th segment bears a fine comb-like fringe of minute spines on posterior dorsal margin. A dark chitinous thickening extends across dorsum of segments 2 to 8 near anterior margin. 10th segment is entire above.

Described from one female. No food plant given. Collected by Mr. E. G. Smythe, Rio Piedros, Porto Rico, Oct. 7, 1919.

Sericothrips portoricensis, sp. nov.

Female:—Color: Head and prothorax deep brown, pterothorax and 1st abdominal segment orange brown; abdominal segments 2-5 with a longitudinally median tan colored stripe occupying about 1/4 the width of the segments, remainder of segments brown, segment six tan, segments 7-10 dark brown; fore and middle femora tan, hind femora nearly as dark brown as abdominal segments 7-10, tibiae light tan, tarsi lemon yellow; antennal segments 1 and 2 straminious, base of 3 gray, remainder of antennae brown, shading from light lemon on 3rd segment to dark brown on segments 6-8 with bases of 4 and 5 gray brown. Wings deep brown, basal fourth (except scale which is brown) gray, a gray cross band in the fourth fifth; hind wings gray except for dark brown median vein.

Head very short, scarcely 1/4 as long as broad, surface very finely striate; eyes dark blackish brown, occupying slightly more than half the width of head and nearly its entire length, pilose with a few conspicuous hairs, facets large; ocelli equidistant, large, margined inwardly, with very dark orange crescents; post-ocellar spines large and prominent, a few small spines on cheeks, four spines across front below anterior ocellus a little larger than setae between facets of compound eyes; mouth cone long, reaching across prosternum, stout, cone-shaped with sides slightly convex; antennae normal except for the branched sense cones which are especially large and thick.

Prothorax only about half as long as wide, quite thickly covered with fine transversely anastomosing lines, sides convex; each posterior margin bears a very stout long spine a short distance from lateral margain, between these two spines there is a chitinous thickening very close to posterior margin; this chitinous thickening extends cephalad from each spine in an arcuate line about 2/3 across the pronotum, each side line boing joined across the front by a concave thickening; the enclosed pronotal area is somewhat darker than the remainder of the segment and bears two small spines on each side, one at the anterior angle and the other midway the lateral margin; the prothorax bears two pairs of small spines on its anterior margin, the first spine of each pair being about 1/8 the width of the anterior margin from the anterior angle and the second spine about 1/8 this width distant from the first. The mesoscutum is very thickly covered with finely anastomosing lines and bears six small but distant spines, one near each lateral angle, one each side the meson about midway between poterior and anterior margins, the other two spines stand, one on each side about half-way between lateral line through preceding two spines and posterior margin but about twice as far from meson as the preceding; the metascutum is longitudinally striate and bears four spines in its anterior margin somewhat smaller than those on pronotum, metascutetlum smooth. Legs not especially long; wings normal to the genus, at the base about 1/9 as broad as long, at the middle about 1/18 as broad as long. Costa bears about 24 spines, fore vein about 20, and sometimes 2 on hind vein near tip.

Abdomen normal to the genus in shape. The lighter color of 6th segment and the light stripe along meson due partly to the absence of the very fine posteriorly directed dark spines found on segments 7-10 and on darkened posteriors of other segments. Segments 2 to 7 each with a dark chitinous thickening near anterior margin. Spines on last two segments rather short. Tenth segment entire above.

Measurements; length 1.10 mm.; head, length0.04 mm., width 0.16 mm.; prothorax, length 0.114 mm., width 0.204 mm.; mesothorax, width 0.26 mm.; metathorax, width 0.24 mm.; abdomen, width at 4th segment 0.28 mm. Dimensions of antennal segments in microns:

	1	2	3	4	5	6	7	8
Length	26	36	57	57	44.9	53	11	16

Described from 2 females collected at Rio Pedros, Porto Rico, March 25, 1920, by E. G. Smythe.

The chitinous thickening on the pronotum and the color will differentiate this species from other species of the genus.

Anaphothrips bicolor, sp. nov.

Female:—Holotype—Coloration: brown and yellow; head, mesothorax, metathorax, first two and last four abdominal segments, first two and last four antennal segments and second quarter of fore wing brown—the head and last three abdominal segments somewhat darker than thorax, the first antennal segment and second quarter of wing somewhat lighter than thorax. Middle and hind coxae light brown. Remainder of insect grayish yellow except basal fourth of fore wing which is colorless, the apical half which is light gray and the 3rd and 4th antennal segments which are very light yellowish. The eyes tinged with orange pigment, the ocelli are light yellow margined inwardly with very dark orange crescents.

Head a little less than 1/5 broader than long, obtusely angular in front of eyes, cheek very slightly convex, eyes slightly protruding, occupying nearly 2/3 the width of head and fully 1/2 its length; ocelli small, approximate, the posterior pair on line with posterior third of compound eyes. Surface faintly and sparcely transversely striate. Four tiny spines stand in a row across front half-way between anterior ocellus and frontal angle, a row of six similar spines cross the head just behind eyes, and a spine of similar size stands just in front of each posterior ocellus. Mouth cone heavy and blunt, reaching 3/4 across prosternum. Antennal joints rather short, sense cones small.

Prothorax somewhat longer than head, about 2/3 as long as broad, broadest across posterior margin, surface smooth and angles without spines. Mesothorax 1/4 broader than prothorax and without visible spines; metathorax about 1/9 narrower than mesothorax. Legs short and thick, unarmed. Wings broad at base, attaining 8th abdominal segment. First third of costal margin bare, at the middle 1/12 as broad as long. The two longitudinal veins indistinct. Spines on wing tiny and transparent. Costa bears about 20, fore vein with a basal group of 3 spines, 3 spines in the brown wing band and 3 widely separated spines beyond, the last one near tip; hind vein bears 7 spines which are more widely separated toward tip than toward base of wing.

Abdomen stout. Eighth segment with a comb of spiniferous tubercles on dorsal posterior margin. Last three segments sharply conical. A small spine at posterior angle of 7th segment, a larger one on posterior angle of 8th segment; the 9th bears six long, light brown spines across its posterior margin. The spines on 10th segment nearly as long as those on 9th. 10th segment split open above.

Measurements—holotype:—Length 0.965 mm.; head, length 0.112 mm., width through eyes 0.13 mm.; prothorax, length 0.122 mm., width 0.14 mm.; mesothorax, width 0.20 mm.; metathorax, width 0.179 mm.; abdomen, width at middle 0.236 mm.; length of antennal segments in microns:

	1	2	3	4	5	6	7	8
	16.3	30	32	34	34	44.9	8	13

Described from 4 females collected on cane, Bayamon, Porto Rico, May 5, 1920, by G. N. Wolcott.

LISSOTHRIPS HOOD
PROLISSOTHRIPS NEW SUBGENUS

Head slightly wider than long, quadrate, very slightly narrowed posteriorly; eyes larger than in *Lissothrips* and directed more laterad; antennae as in *Lissothrips,* except that sixth segment is slightly longer than seventh. Mouth cone broad and sharp-pointed at tip, extending only 3/4 across prosternum. Labium broad and broadly rounded. Prothorax very slightly shorter than head, the five pairs of bristles very noticeably expanded at tips and much shorter than in *Lissothrips.* Fore tarsi unarmed. Most of the abdominal spines expanded at tips.

The shorter mouth cone, the shorter and more expanded spines and the quadrate head suggests a genus distinct from *Lissothrips,* but since the only specimen known is a male, I hesitate to give it generic rank, preferring to place it in a subgenus under *Lissothrips,* to which it is so very closely allied.

Lissothrips (Prolissothrips) stratulus sp. nov.

Male:—General color uniform dark brown, with scarcely any shading, except for second antennal segment, which is slightly lighter and the 3rd antennal segment, which is gray.

Head, quadrate, about 1/4 wider than long, cheeks slightly roughened and slightly convex. Eyes directed somewhat laterad, occupying about half the width of the head and 1/3 its length. Ocelli wanting. Post ocular bristles of medium length and markedly expanded at tips. Mouth cone pointed at tip and reaching 3/4 across prosternum, labium broad and broadly rounded, over-reaching the mouth cone.

Prothorax a little shorter than head, measured through coxae 2 1/2 times as broad as long and 1 2/3 times as broad as at anterior margin; bearing five pairs of well-developed spines—not nearly as long as those of *Lissothrips muscorum*— which are markedly expanded at tips. Meso and metathorax about 4/5 as wide as prothorax through coxae. Mesonotum with a pair of spines with expanded tips at its lateral posterior angles. Anterior margin of mesothorax shouldered at the angles. Legs short and stout. Tarsi unarmed. Wings wanting.

Abdomen scarcely broader than prothorax through coxae. Posterior margin of abdominal segments 2-9 each, with two pairs of bristles of medium length, all expanded at tip, except the ones at lateral angles of 7th and 9th segments, respectively, which are sharp pointed. Tube stout, spines at its tip sharp pointed and scarcely more than half the length of the segment.

Measurements: Length, 0.948 mm.—abdomen somewhat extended; head length, 0.089 mm.; width 0.106 mm.; prothorax, length 0.857 mm.; width on anterior margin 0.122 mm., through coxae 0.204 mm.; mesothorax, width 0.17 mm.; metathorax, width 0.155 mm.; abdomen, width at 3rd segment 0.204 mm. Tube, length about 0.073 mm.; width at base, 0.053 mm.; at tip, 0.024 mm. Length of antennal segments in microns:

	1	2	3	4	5	6	7	8
	18	32	24	27	28	32	28	28

Described from one male taken by F. Sein, from stomach of a lizard, *Anolis stratulus* Cope collected at Santa Catalina, Porto Rico, May 9, 1924. Elevation 1,500 feet.

Gastrothrips fuscicauda, sp. nov.

Female:—Holotype, color: Head, thorax and abdomen very dark brown; all femora, middle and hind tibiae dark brown; fore tibiae brown, fuscus on outer margin; fore tarsi yellowish brown, middle and hind tarsi light brown; first antennal segment brown, the second a little lighter, the third yellowish brown, the fourth colored like the second, fifth to eighth dark brown; tube black.

Head longer than wide, obtusely angular in front, narrowing from middle to base, where it is about 5/6 as wide as at middle; postocular spines alone prominent, light brown and sharp pointed. Mouth reaching about 3/4 across prosternum, constricted near tip, rounded. Labium broad and broadly rounded. Eyes occupy nearly 2/3 width of head through them and not quite 1/3 its length, facets smaller than ocelli. Ocelli rather large, posterior pair situated in front of middle of eyes and contiguous thereto. Anterior ocellus on extremity of head and pointing forward. Antennae normal, 5th to 7th segments stalked, 3rd segment narrow at base—inverted cone-shaped.

Prothorax only half as long as head and only about 1/3 as long as the width through coxae; all spines present, reduced in size, those on anterior margin tiny, those on posterior angles alone prominent, mesothorax about 1/9 broader, and metathorax very little broader than prothorax. Legs rather short and slender, except the fore pair. Fore femora enlarged, about 2/3 as broad as head, fore tarsus armed with a stout tooth about as long as diameter of tarsus. Wings present, but not spread, and the details cannot be seen.

Abdomen stout. Spines prominent alone on last four segments, those on 9th segment being nearly as long as the tube, those at tip of tube about 5/6 as long as tube.

Measurements: Length 2.03 mm.; head, length 0.24 mm.; width at middle 0.224 mm.; prothorax, length 0.129 mm., width through coxae 0.38 mm.; mesothorax, width 0.422 mm.; metathorax, width 0.396 mm.; abdomen, width at 5th segment 0.47 mm. Tube, length 0.19 mm.; width at base 0.129 mm., at tip 0.06 mm.; very slightly constricted at tip. Dimensions of antennal segments in microns:

	1	2	3	4	5	6	7	8
Length	51	60	86	77.6	60	45	?	?
Width	40	35	34	34	34	29	25	17

Described from 1 female collected in Porto Rico from the stomach of a lizard, by Mr. G. N. Wolcott. This species may be easily distinguished from its nearest congener *G. texannus* Hood by its greater size.

Gastrothrips anolis, sp. nov.

Female:—Color, head light brown; thorax and all but 10th abbnominal segment dark blackish brown; tube dark orange; fore femora yellowish brown, fuscus on outer side, middle and hind femora slightly lighter brown than head, with decided fuscus tinge toward bases; fore tibiae lighter brown than head, middle and hind tibiae darker brown than head, but not so dark as abdomen; fore tarsi pale yellow, middle and hind tarsi pale brown; 1st antennal segment deep yellow, 2nd yellowish brown, 3rd light brown with fuscus tinge at base and on sides, 4th dark brown, 5th to 8th dark blackish brown.

Head as wide as long, widest just behind eyes, at the base only 4/5 as broad as just behind eyes; eyes medium, occupying only slightly more than half the width of the head and not quite 1/3 its length, cheeks set with a few small spines; postocular bristles, well developed, yellow; ocelli small, the posterior pair opposite the middle of eyes and contiguous thereto, anterior ocellus on line with front of eyes; mouth cone reaching 3/4 across prosternum, constricted near the tip and pointed, labium broad and broadly rounded; antennae normal, 1st joint cylindrical, 4th-7th stalked.

Prothorax about 4/5 as long as head and twice as broad (through coxae) as long; all the usual spines present, sharp pointed, although the anterior marginals are small. Mesothorax only slightly broader than prothorax, sides nearly parallel, metathorax nearly as broad as mesothorax; legs of medium size, fore femora slightly thickened, fore tarsi unarmed; legs sparsely clothed with long setae.

Abdomen stout, broadest at about 6th segment. Spines well-developed only on last four segments; those on 9th segment being nearly as long as the tube. Tube stout, rugulose, constricted near, but not darkened at tip. Terminal hairs scarcely as long as basal width of tube.

Measurements:—Holotype. Length 1.6 mm.; head, length 0.215 mm., width 0.215 mm.; prothorax, length 0.172 mm.; width through coxae 0.344 mm.,

The

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mesothorax, width 0.379 mm.; metathorax, width 0.361 mm.; abdomen, width at 6th segment 0.49 mm.; tube, length 0.18 mm., width at base 0.094 mm., width at tip 0.051mm. Dimensions of antennal segments in microns:

	1	2	3	4	5	6	7	8
Length	50	61	81.6	69	67	61	44.9	44.9
Width	44.9	36.7	32.6	35	35	30	23	13

Described from 1 female collected from the stomach of a lizard, *Anolis pulchellus* D. & B. Porto Rico. G. N. Wolcott, collector.

This species may be distinguished from its nearest congener, *G rufi-cauda* Hood, by the yellow color of the 1st antennal segment and by the light brown head.

Diceratothrips wolcotti, sp. nov.

Female:—General color dark blackish brown; fore femora yellowish brown at tip inside and bases of all femora yellow brown; hind and intermediate tarsi brown, fore tarsi bright yellow brown; antennal segments 1 and 2 and all but tip of 3 yellow brown, remainder of antennae dark brown. Fore wings brown in basal half, fading to gray brown in apical half; hind wing shaded like front wing, but lighter; both wings with two dark brown longitudinal stripes running from near base to about middle of wing; one stripe near anterior margin of wing, the other through the center.

Head 1/4 longer than wide—cheeks slightly convex—narrowed somewhat behind and constricted just before a collar—like thickening very near posterior margin; surface roughened, cheeks set with a few short, stout spines; eyes moderate in size, finely facetted, not pilose; ocelli large, well separated, posterior pair very near inner margins of eyes and standing almost entirely back of middle of compound eye; anterior ocellus in a depression in front and strongly inclined forward. Post ocular bristles long and sharp; the pair of bristles on front laterad of anterior ocellus large and blunt, reaching to middle of 2nd antennal segment, just mesad of each of these bristles may be seen a small bristle about 1/5 as long as its companion. Antennae normal to the genus, twice as long as head. Mouth cone broad and broadly rounded at tip; reaching 3/4 across prosternum.

Prothorax large and heavy, nearly twice as broad through coxae as on anterior margin, anterior margin strongly concave. All the usual bristles present, only those on posterior angles prominent, anterior marginals minute. Meso and metathorax broad and heavy; mesothorax but little wider than prothorax through coxae. Wings broad but short, barely attaining posterior margin of 5th abdominal segment; enlarged toward tip, posterior margin with about 37 accessory hairs near tip. Legs of medium length; middle and hind femora strong, fore femora incrassate with about 3 short spines near the middle within, surface sparsely clothed with smaller spines; middle and hind femora similarly clothed; middle and hind tibiae each with two long setae without, set at end of second fifth and near tip, respectively; fore tarsus with a much shorter seta without just before middle. Fore tarsi with a blunt tooth.

Abdomen well developed, rather long, with long spines at lateral posterior angles of 5 to 9—a single spine on 5 and 6 and a pair on 7 and 8; 9, with the usual circlet, which is nearly as long as tube; spines on tip of tube only about 1/3 as long as tube.

Holotype:—Measurements, length 4.40 mm.; head, length 0.43 mm., width 0.344 mm.; prothorax, median dorsal length 0.224 mm., width through coxae 0.594 mm.; mesothorax, width 0.62 mm.; metathorax, width 0.603 mm.; abdomen, width at 5th segment 0.594 mm.; tube, length 0.49 mm.—about 3 times as long as 9th segment—width at base 0.146 mm., at tip 0.06 mm.; fore femur, width 0.21 mm. Dimensions of antennal segments in microns:

	1	2	3	4	5	6	7	8
Length	51	94.8	224	172	137	103	90	43

Described from two females. Holotype from Cayey, Porto Rico, on leaves of Ingavera, 1923. Paratype from Port Cangrejos, Porto Rico, on cotton boll. G. N. Wolcott collector of both specimens.

Named in honor of Mr. G. N. Wolcott, in recognition of his interest in collecting this order.

This species may be readily separated from its congeners by the coloration of the first two antennal segments and by the long setae on the front lateral of the anterior ocellus.

ANOTHER YEAR OF THE CITRUS APHIS

J. R. WATSON

(Contribution from the Entomology Laboratory, Fla. Ag. Exp. Sta.)

Between April 18 and 20 two days of hot, humid weather caused such a severe epidemic of *Empusa* among the green aphids of citrus (*Aphis spiraecola,* probably identical with *Aphis pomi*), as to bring them under practical control. Altho the aphids are at this date (May 11) again increasing and may injure the "June growth," the season is getting so far advanced that it is not probable that much more damage will be done this year. For several weeks their numbers had been sharply decreasing, due to the maturing of the first flush of growth, but after the epidemic of *Emusa* it required considerable search to find enough live aphids to keep our life history work going. It was estimated that 99.9% of the aphids perished in the epidemic. Last year the destruction was even more complete, but did not occur until the middle of June, nearly two months later than this year.

The damage done has been great, in the aggregate much greater than last year. In the territory where the aphis appeared early in the spring of 1924 (in Pinellas, Hillsborough western Polk and southward to Lee County) the general opinion of the growers is that this year's infestation was somewhat less severe than last year's. But the territory severely infested this year has been so much more extensive that the sum total of damage done has been much greater. Undoubtedly the crop of fruit has been much reduced, altho the short crop in prospect for next winter's harvest cannot be entirely laid at the door of the aphids. Certainly the aphids are not responsible for the short grapefruit crop. But the damage does not stop at this year's crop. The destruction of the young growth by the aphids this spring has undoubtedly shortened next year's crop, *i. e.*, the crop to be harvested during the season of 1926-27. This is indicated by the observation that the trees severely injured early in the spring of 1924 put out very little bloom this year and are carrying very little young fruit.

In addition to the loss of fruit and of growth on the young trees, the growers have been put to a heavy expense for insecticides and labor expended in the application of the same. Natuurally, largely due to the inexperience of the growers with this new pest, much of this has been largely wasted. Insecticides have been applied at the wrong time or with insufficient thoroness, and, unfortunately, insecticides of poor quality have been sold.

As a result of this year's experience a number of outstanding facts are apparent.

(1) *The aphids do most damage in the earliest stages of the flush of growth of the citrus, and, consequently, control measures will be most effective at that time.* Half grown foliage, blossoms and young fruit will stand a rather surprisingly heavy infestation of aphids. An experiment carried out at Lake Alfred illustrates this. A number of heavily infested branches bearing very young fruit, blossoms and buds were selected. Half of these

were dipped in a soap and nicotine solution or in a "Derris oil" solution and all aphids killed, and the other half left for a check. These twigs were carefully selected in pairs of practically the same degree of infestation, of similar size and vigor, and carrying about the same number of blossoms and buds. One member of each pair was dipped and the other not dipped. On the dipped twigs an average of 74% of the blossoms set fruit, and on the undipped 62. This difference, considering the small number of twigs, was almost within the limits of probable error. After the petals drop most of the aphids attack the calyx rather than the young orange, altho in this case enough attacked the young fruit to severely roughen it. Experience of last year indicates that as these oranges mature they will largely outgrow the bumps.

The aphids do the most damage when they attack the very young sprouting buds, the "buttons" or "points," as they burst thru the bark. One or two aphids can completely stop the growth of a "button" an eight or a sixteenth of an inch long. These embryonic twigs are often covered with aphids. For this reason control measures should be instituted upon the first appearance of these minute "points" of growth in considerable numbers. Spraying, moreover, is much more effective at this stage of growth than it is later on when there are curled leaves in which the aphids can find protection. Furthermore, in the early stages of the "flush" of growth when the amount of suitable food is on the increase, comparatively few of the aphids develop wings. Hence, if one cleans up his trees at this time they will not be as quickly reinfested. In many cases it has been ten days or two weeks before the infestation again became heavy enough to cause much damage. It is the maturing of the foliage that acts as a stimulus for the development of winged aphids. Moreover, this maturing of growth causes the wingless adults and young to become restless and move about. The dipping experiments on the blossoms mentioned above brought this forcibly to our attention. The aphids on the twigs were counted and a recount a day or two later showed that sometimes as high as 50% of the aphids had disappeared, while many well grown individuals were found on the twigs which had been dipped but a day or two before.

(2) *Whatever measures are taken against the aphids should be thoro.* Under favorable weather conditions an aphid will bring forth six young a day. This means that if the grower kills five-

sixths of the aphids on a tree the one-sixth left will have reproduced the original number in twenty-four hours, leaving out of consideration the number eaten by predators meanwhile. Of course, he has given the aphids more than a twenty-four-hour setback because several days must elapse before the young aphids can start breeding. But if he can kill 95% of the aphids the predators can be depended on to make some impression on the remainder.

The two methods of control which have been most uniformly successful under most weather conditions are dipping and dusting under tents or fumigation.

Dipping is applicable only to young trees, up to two or three years, and then only when the new growth is mostly out on the ends of the branches where it can easily be bent over into a bucket. Effective and perfectly safe dips are a solution of "derris oil," a tablespoonful to a gallon of water, or the same amount of nicotine sulphate plus an ounce or less of soap. If too much soap is used burning may result.

Dusting under tents has been very effective and practical, and an average kill of 99.7% has been obtained. A crew of three men with a battery of from six to ten tents can fumigate an acre an hour if the trees are not over 9 or 10 feet high. Using 3 percent nicotine sulphate lime dust, trees averaging 7 feet in height, cost 8 mills per tree for dust, less than a cent. The saving of dust on young trees, as compared with dusting in the open, almost compensates for the increase in labor cost, and the percentage of kill is much higher. Different types of tents have been designed to accommodate different sized trees. For trees less than a year old, sheeting stretched over a framework made of telephone wire has been satisfactory. A vegetable hamper covered with sheeting would answer. For trees up to a height of five feet, 6-foot "rabbit" wire fencing rolled into a cone makes a satisfactory framework. These tents are set over a tree, which is then dusted throu a hole in the tent. For larger trees, up to 9 feet, a tent made in the form of half a cone, with a framework of ⅝-inch gas pipe, has been found most satisfactory. It does not have to be lifted over a tree, only set up against it. A sheet of cloth with one side only sewed to the framework serves as a flap to close the open end after the tree is dusted. For larger trees tents made after the model of those used in California are best. For smaller trees tents made in the form of a bag stiffened by an application of parrafin and an iron hoop around the bottom have been very satisfactory and have the advantage of being easily transported.

A dust of calcium cyanide has been successfully used under tents. If, however, too large a dosage is used or the humidity is high, burning may result. Experiments are now in progress, in cooperation with the American Cyanamid Company, to test out the practicability of killing scale insects as well as aphids by this method. Nicotine sulphate dusts can be safely used in any weather and are effective except during a rain or cold, cloudy weather. An exposure of from one to five minutes is sufficient, half a day does no harm. These dusts will also kill rust mites and scale crawlers. Red spiders require a longer exposure. Lady beetles in all stages and syrphus fly larvae usually go thru without injury.

(To be Continued)

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EDEN RECLAIMED. "Deep Spring" in the Background

RECLAIMING EDEN

DR. HENRY G. BRANHAM,
Okahumpka, Fla.

It is believed that man originated and dwelt for aeons in the tropics before venturing into the colder regions of the earth. Did they migrate because of over population, or were they driven out by the advent of the disease bearing mosquito? According to the late Surgeon General Gorgas, it was more probably the latter.

Fleeing the mosquito, man came to colder places where vegetation grew only at certain seasons of the year—there the cold of winter made him live in caves, wear clothing, and keep near the constantly burning fire. Unable to hunt profitably at this time of the year, he gradually learned to capture and to keep alive in his cave certain herbivorous animals for his winter's meat. They required food. Their descendants, born in captivity, were the forbears of our domestic animals. Nuts and grasses were propagated for them as close by as possible. In times of meat scarcity these were eaten by man. Thus the beginnings of agriculture. Controlled fire has given us machines, cement, electricity. But all this depended on the brain-developing process we call reason. Community life beginning around the home fire probably did more to foster this than any other one thing. Thus, according to this interesting speculation of Dr. Gorgas, the mosquito was responsible for our civilization.

Whether or not it was thus responsible, the mosquito's occupancy up to this time of the choicest land on earth may well be made a direct cause of an indefinite retarding of our progress. Man's crying need is for rich land on which cheap food can be produced with an ample return to the farmer. The "malaria land" of the South capable of producing crop after crop practically the whole year round is such land. Quantity production and continuous profitable productive occupation is of as great value to the farmer as it is to the manufacturer.

The shaded map of U. S. Public Health Reports ("Distribution of Malaria in the United States as indicated by Mortality Reports", by Assistant Surgeon Kenneth F. Maxey, U.S.P.H.S.), shows the tremendous amount of such land in this country, all of which can be redeemed.

Dr. Henry R. Carter, Assistant Surgeon General of the U. S. Public Health Service, the man who with Gorgas made possible the building of the Panama Canal, says "The loss of efficiency caused by malaria in the country of the malarious section of the South is beyond comparison greater than that caused by any other disease, or even by any two or three diseases combined, including typhoid fever and tuberculosis."

The land is here, the removal of malaria will make the native labor efficient and attract ample outside capital and labor to make this part of our country capable of producing enough food stuffs to make war for conquest on the part of this country totally unnecessary. Properly divided, there is enough similar land elsewhere to more than satisfy all nations. Best of all, the land could *now* be easily apportioned because it is cheap and only potentially desirable. Civilization can hardly survive another general war for "a place in the sun". If we, instead of fighting one another for land already fully occupied by mankind, will only fight the pestilence carrying mosquito, and till the lands from which she now excludes us, there need not only be no more wars of conquest, but there will be no necessity for birth control or for plagues to keep down the numbers of overcrowded and underfed.

There are millions of acres of such land right here in our own country. This land has not been reclaimed, among other reasons because of the hitherto prohibitively large cash outlay necessary. The purpose of this article is to show how this can be done at a cost of practically nothing over and above the amount that always has to be spent in clearing land to make it fit for farming. Here is how it actually was done on our farm in Florida. The land in question is a typical specimen of malarial land in the southeastern part of this country. The methods successfully used here will, with but little modification, answer anywhere in the South.

We have a beautiful spring nearly two hundred feet deep, covering about three acres, with an outlet creek about four feet deep and thirty wide. On the south of the spring is a six foot bank with high land behind it. On the other sides of the spring, and along both banks of the stream, is a strip of cut over cypress swamp and marshland averaging about fifty feet in width. Beyond the marsh the land gradually rises to about twelve feet above lake level. The creek was choked with water lettuce and other aquatic plants and there was a border about fifteen feet wide of the same material all around the spring.

A large fish-free pond about fifty yards to the west of where our house was to be not only bred mosquitoes, but in wet weather overflowed our proposed garden site. A ditch sixty yards long was dug from the pond through the end of a half acre hummock marsh one hundred feet away, and from there into the spring. The marsh land was grid-ironed with shallow ditches, all connected with the main ditch. The muck from the ditches was piled on the hummocks for banana plants and put into barrels for strawberries. The ditches were dug around the hummocks so that the marsh, instead of a series of puddles, became one body of water all of the year.

When bought, the dry land was a jungle of trees, brush, and thorn filled vines. The swamp and marsh, all of this, plus muck and water. The trees were filled with Spanish moss. In warm weather the whole place swarmed with mosquitoes.

Some fourteen acres to the south and west of the spring were cleared, and ten of it set out for a citrus grove, and one for a vineyard. The rest was used as a site for the necessary buildings, for a pig pen, a chicken run, an orchard, a garden, and a lawn. As far as was practicable, vines, moss, and underbrush were removed from the rest of the place. The larger trees were left and make a beautiful woodland park. A six room white bungalow with two screened porches and sixteen large French windows—the 16 mesh galvanized wire screening attached directly to the outside of the window casings by ½ x 1 inch black wood strips—was built. Our outside buildings, electric and water plant and septic tank sewerage installed, farm implements and stock purchased, we now had a complete farm. A well screened house will remain a necessity until such a large area of land is treated that the home lies beyond the flight range of all mosquitoes.

Having a place to live, I now proceeded with my "anti-mosquito campaign".

In order that the reader may really understand this fight, it is necessary that he first know some few things about the mosquito, its friends, its natural enemies, and its enemies' friends and foes.

The accepted flight range of the malaria carrying mosquito is about a mile. She is only a carrier of malaria, and cannot infect one until she has first bitten a person who has malaria. Five grains of quinine a day will keep one from getting malaria, while he gets rid of his mosquitoes. This usually holds true no matter how often one may be bitten by infected mosquitoes. In order to reproduce, the mosquito must have a blood meal from any warm blooded animal, and water on which to lay her eggs. Tin cans, old automobile casings, faulty rain gutters, water troughs, small puddles, etc., will answer instead of ponds and lakes for some mosquitoes. The malaria carrying mosquito cannot stand sunlight. Wind modifies greatly the flying of all mosquitoes. So dark places and wind breaks of any kind are great aids to the pests in their journey to and from their blood meal. The male mosquito does not need any blood meal, and therefore is not anatomically especially fitted to bite.

The immature malaria mosquito spends its life in water. It can breathe only when at the surface, and stays there nearly all of the time. Water vegetation helps it greatly in its efforts to escape the minnows that pursue it.

Certain plants may, and creosote does, repel the mosquito.

A top swimming minnow, whose favorite food is the immature water dwelling forms of the mosquito, is present in fresh and sometimes in slightly brackish water, from the Gulf of Mexico to New Jersey. The young of this minnow are born alive—as many as two hundred at a time—and ready to eat the smaller water living mosquitoes. When food is scarce, these minnows eat their young. Shallow, weedy waters where they are reasonably safe from larger fish and where young mosquitoes are plentiful, are their favorite natural haunts.

Larger fish, water birds, and at least one water insect prey on this top minnow. Other minnows and some of the larger fish eat the water living forms of the mosquito, but the top minnow is by far our most reliable ally in this respect. Some other insects, insectivorous birds, bats, lizards, and frogs hunt the winged mosquito. In turn, these are hunted, principally by birds, snakes, and large fish.

As direct and indirect aids to the mosquito, we thus have exposed standing water, unscreened sources for her "blood meal", brush, Spanish moss, aquatic plants, hollow trees, unscreened buildings, and other hiding places, for either the immature or the winged mosquito; finally the things which interfere with the multiplication of the mosquito's enemies.

It is obvious that a sufficient number of the mosquito's enemies, plus the removal of enough of its aids, would result in its eventual extermination over an area thus protected.

It remained for actual experiment to show that this condition could be brought about in a reasonable length of time and for a very moderate cost.

The cleaning done for agricultural purposes removed a large proportion of its day hiding places. This was continued in the parking done at a cost of about five dollars an acre. The land parked could have been profitably cleared for agriculture.

High grass, weeds, ets., were mowed. The cost of doing this comes properly under the head of common orderliness on any farm. Hollow trees, unscreened buildings, wooden steps, etc., were painted inside with creosote paint, at a cost of twenty dollars.

Finding the aquatic plants, especially water lettuce, excellent food for chickens and stock, and also of great value as fertilizer, they contained small water animals making its phosphorus value high, the cost of keeping this down was not estimated. It would not be fair to charge stock food and fertilizer to the mosquito.

From the nature of things, the removal of hiding places for the mosquito, especially weeds, is not a job that is finished and done with, it is one of any farmer's constant tasks anywhere.

This day after day job keeps down materially the number of the places where the mosquito can hide and be more or less safe.

The potential breeding places of the pest were destroyed where possible (tin cans, very small puddles, etc.). Wells and mud puddles were stocked with the hardy cat fish. Larger isolated ponds were stocked with the top minnow. One large pond and many isolated marsh puddles were connected with one another and the lake by ditches, too shallow for the large fish that eat the top minnows to negotiate, and denied to the young predaceous fish by one half inch hardware cloth. These ditches make excellent breeding places for the top minnow, and from them are obtained not only stock for outlaying ponds, but the constant migration, due to over population of minnows, into the spring and stream, keeps them filled with sufficient minnows to satisfy the larger fish and still leaves a margin sufficient to cope with the mosquitoes hatched there; this in spite of the large amount of water plants present. Another fish preferred to the top minnow by the larger fish and much sought after for bait was protected from the fisherman, and multiplied rapidly. Fishing birds were shot when caught near these breeding places. Other ponds within a radius of a mile were stocked with top minnows. Breeding sanctuaries (smaller models of the hummock marsh ditches) for the top minnow were built for the nearer and larger of these.

Our top minnows cost us nothing. The ditching cost less than fifty dollars. In this way the breeding places were made very unsafe for the young mosquito. The number of top minnows in a fish filled pond is usually small, and they are to be found only in the shallow places and hiding among the plants. Naturally quite a few mosquitoes escape and reach the flying stage. My plan, however, results differently. Not only is there a constantly arriving fresh supply of top minnows, but the larger fish are furnished a supply of small fish ("Shiners") preferred by them, as a food, to the top minnows. Many forms of aquatic animals subsist on the water plants left, and help greatly in keeping our minnow eating fish away from the top minnow.

The top minnow being too numerous to obtain sufficient food near the shore, and being but little bothered by the larger fish, spreads over the surface, and naturally eats many more young mosquitoes.

Notwithstanding the tremendous superiority of this over the older methods, relatively small numbers of mosquitoes reach the final or winged stage of life. These then attempt to perpetuate their species. As said before, they must have a blood meal and protection from light and wind. These we have done our best to place beyond their reach. However, trees, grass, wild and domestic animals, will always be here. So we have tried to make his hiding places not only scarce but disagreeable, and even dangerous. Frogs and toads search out and eat mosquqitoes, on the banks of ponds, streams, and in inland grass. Protected from man, owls, hawks, and snakes, they have multiplied so that one has to watch one's step. The hornless chameleon has the same enemies and performs the same function in bushes, trees, under uneven logs, etc. Spiders are encouraged in dark corners, hollow trees, etc. We soon had as many of all of these as we needed without resorting to breeding. The small tree frog, however, not only hunts mosquitoes, but is very useful in fruit and citrus trees as a destroyer of certain insect pests. It was found that a small box of hardware cloth placed over these tadpoles in a puddle allowed an unusual number of them to reach maturity. Hunted even by chickens, small tin tobacco boxes attached to trees make them excellent citadels.

What few mosquitoes escape all of this and start to fly are confronted by an unusual number of insectivorus birds. Bird houses for their young, the killing of their enemies, and the abolition of the "sport" of killing them has been all that was necessary in this respect.

These frogs, birds, etc., form an excellent outside "screen", far preferable to the old method of placing domestic animals between the house and the pond, in the pious hope that the mosquito would obtain her blood meal from the poor beasts. The object of my screen is to prevent the mosquito getting her "blood meal", not to furnish her one.

Having ample top minnows to fully stock, when danger threatened, any pond that had previously unexpectedly "gone dry", no necessity arose to use dirty, expensive, soil destroying oil, or for extensive drainage by ditch or by digging through the underlying water-impervious sub soil. A small well dug below permanent water level will leave, in dry weather, a place where some top minnows will survive until the pond fills again. The small amount of work of this kind was done either to beautify the place or for agricultural reasons. Nevertheless, the cost will be included in the anti-mosquito budget.

Every species has its natural enemies, and from time to time, as these enemies have triumphed, whole species have disappeared. In the case of the mosquito, these enemies are well known, and, as I have shown, can be readily increased to the point where they will wipe out the mosquito. The cost is negligible. The work here was done on a small tract of land where the mosquito had every advantage nature could supply it. The larger the land area the smaller the cost per acre, and the more nearly perfect the result. The upkeep will diminish with time and the enlargement of the area treated.

Anti-mosquito work requires the active cooperation of every one concerned. That is the reason why we still have malaria. When it is generally known that nature's balance maintaining the mosquito may be altered with a pennyweight sufficiently to put dollars in the pockets of the man doing the work, then we will get this cooperation.

The total outlay required to make our home mosquito free and to keep malaria off the place was less than two hundred and fifty dollars. At the very most, a yearly expenditure of fifty dollars will maintain this condition. Mosquito land is usually fallow muck, and very valuable when malaria is absent. Such land can be bought very cheaply in all of the southern states. Practically unlimited quantities of this land can be purchased, put in condition for planting, and cleared of mosquitoes, for less than one-crop land costs elsewhere. The farmer can raise "money crops" over a large part of the year; twelve months in Florida. This naturally tends to raise land prices, and to remove farming from the list of seasonal occupations.

There is a tremendous lot of this land on every continent. May man occupy it and live in peace and plenty.

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J. R. WATSON..*Editor*
WILMON NEWELL..*Associate Editor*
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In connection with Dr. Branham's article in this number of the Entomologist we wish to call attention to U. S. Public Health Bulletin No. 114—"Top Minnows in Relation to Malaria Control, with Notes on their Habits and Distribution" by Samuel F. Hildebrand.

DESTRUCTION OF MOLE CRICKETS

In many of the cities of Florida the West Indian mole cricket or "Changa" is getting to be a great nuisance in gardens. In damper soils also the native species are often troublesome. The poisoned bran baits have been found useful in controlling the pests and frequent cultivation and plowing have been recommended. Mr. S. C. Whidden of Jacksonville reports the following method to be highly efficient. He plows the garden and, if dry, wets it thoroly. He then rolls it thoroly and leaves it until the next morning. During the night the mole crickets in the ground throw up little mounds of dirt. In the morning Mr. Whidden goes out with a cane and a bottle of carbon-bisulphide and treats each burrow. Doubtless a solution of sodium cyanide and perhaps a few crystals of calcium cyanide would work as well and be considerably cheaper.

PERSONALS

Dr. E. D. Ball, elected to take charge of the Celery Leaf-tyer investigations of the State Plant Board provided for by the last session of the legislature, has taken up his residence in Sanford. He gave an address on controlling truck crop insects during Farmers' Week at Gainesville. The truckers of Florida are to be congratulated upon securing the services of a man of Dr. Ball's wide experience and ability.

Mr. Archie N. Tissot has been elected assistant Entomologist of the Experiment Station in the place of Mr. A. H. Beyer, who has resigned to devote his time to his numerous grove interests. Mr. Tissot received his Master's Degree in June from Ohio State University. He is now teaching in the summer school there, and will take up his duties in Florida on September first.

Mr. W. W. Yothers, of the Bureau of Entomology at Orlando, is travelling in the Pacific Coast states, investigating the use of oil emulsion sprays there.

Dr. H. L. Dozier has resigned his position with the Insular Experiment Station at Rio de Piedras, Porto Rico, to accept a position as entomologist for the Delaware Station at Newark.

Mr. A. C. Brown has resigned from the State Plant Board to take up grove development work at Ft. Lauderdale.

ANOTHER YEAR OF THE CITRUS APHIS

(Continued from page 13.)

Dusting in the open with nicotine sulphate lime dusts is effective *if there is no wind,* but this condition is seldom met during the aphid season. To be highly effective the cloud of dust should hover over the tree a full minute. Much of the dusting done this season has given unsatisfactory results because of wind or poor dust. Some of the dusting done with a power duster on quiet nights has been very effective, an hour's search in the grove the following day failing to yield a single live aphid.

Spraying, too, is effective if thoroly done and done in time, *i. e.*, before the aphids have curled the leaves. It is difficult to get a spray into the curled leaves. The oil emulsions, lime sulphur, and soap sprays are effective, but the kill is much more thoro if nicotine sulphate is added. But to get a satisfactory control by spraying one must do much more thoro work than has been customary with crews spraying for whitefly or purple scale. A great advantage of spraying is the possibility of combining the control of aphids with that of whitefly, scale, thrips, rust mite, or red spiders.

(3) *Begin the fight in the fall.* Aphids can be fought most economically during the winter. The first step in preparation for next year's fight (we can see no valid reason on which to base a hope that they will not again appear in destructive numbers next season) is to employ every means consistent with good grove practice to throw the trees into complete dormancy in the late fall, about November in most sections. Then during December and January watch the trees carefully and destroy every aphid found. It would probably be an excellent idea to cut off those occasional sporadic sprouts that start out on young trees. Make every effort to have the groves free of aphids by the first of February. In the spring, as early as is considered reasonably safe from the standpoint of danger from frost, do everything consistent with good grove practice to rush the growth along and get a good crop of new foliage out before the aphids become numerous.

(4) *With the exception of the fungus Empusa, the natural enemies of the aphid are generally incapable of checking an outbreak.* The lady beetles and syrphus fly larvae destroy many aphids, but their multiplication is checked by numerous superparasites. The hymenopterous parasite, which is usually the most effective check on the increase of the melon aphis on citrus, has been repeatedly bred out on the green aphis, but its occurrence on this species in the groves is still so uncommon that the presence of any considerable number of dead, swollen aphids with emergence holes is a sure indication of the presence of the melon aphis.

OTHER HOSTS. In addition to spiraea and citrus the aphid occurs occasionally on a number of hosts. Three of them are quite common in citrus groves and are often quite heavily infested. Perhaps the most dangerous of these is the "Jerusalem oak" *(Chenopodium* sp.). Even more heavily infested is fireweed *(Erechtites hieracifolia* (L) Raf.) but it is not as common in citrus groves, being found mostly on lower more moist land especially when newly cleared. These two plants should be cut down before a grove is dusted or sprayed. Cudweed *(Gnaphalium* sp.) is a very common winter and early spring annual in citrus groves, but the aphids attack only the heads and consequently this plant is not an important host in the early part of the winter when few heads have appeared. In many cases grapefruit has been heavily infested this year. In most cases, however, it was near heavily infested oranges from which the aphids were being driven by the maturing of the foliage.

In May and June the Experiment Station received from the California Experiment Station two shipments of a lady-beetle (*Leis* sp.) which was originally brought from China. This lady-beetle is much larger than any native species. The adult female is 5/16 of an inch wide and nearly $\frac{3}{8}$ inches long. The ground color is red. There are thirteen round black spots on the elatra and a larger one on the thorax. The beetle's appetite for aphids is in proportion to her size. Sometimes as many as two hundred aphids are eaten in a day. But our hopes for this beetle were chiefly that it might be less susceptible to the fungous and bacterial diseases which are such a large factor in checking the multiplication of our native species. Experience in breeding these beetles in the laboratory at Lake Alfred would seem to justify this hope. Altho many have died of diseases, the proportion is distinctly smaller than in the case of the blood red lady-beetle, the most common of our native species in aphid colonies.

The original small number of these beetles brought to Florida has increased until we now have several hundred on hand and have liberated as many more in groves scattered over the state. While some of the early colonies liberated seem to have died out, (due apparently to scarcity of food) others seem to be prospering, and in at least one grove the beetles have completed a full generation in the field, thus demonstrating their ability to live out of doors in Florida, at least during the summer time. From the standpoint of the food supply the summer is the most unfavorable season, as aphids are scarce.

As to the outlook for the future, the aphids are much more numerous in our groves than they were a year ago at this time. Much will depend upon the weather during the next five months. Unless their numbers are greatly diminished by dry or cold weather throwing the trees into complete dormancy during the fall or winter, the prospect is for another heavy infestation next spring.

A NEW Species of Symphyothrips (Thysanoptera) from Argentina

J. R. WATSON

Symphyothrips reticulatus sp. nov.

Whole body including legs uniform chestnut brown; only tarsi and antennal segment 4 a little lighter brown, and antennal segment 3 yellowish brown.

Head about .2 longer than broad. Cheeks straight, converging only slightly posteriorly. Dorsum with anastomosing reticulations forming a network. *Eyes* rather small, dorsal length considerably less than a third of the head; non-protruding; facets large. *Ocelli* large, yellowish, bordered by dark crescents; posterior pair situated opposite the middle of the eyes; anterior directed forward. Post-ocular bristles conspicuous, considerably longer than the eyes, widely dilated at the tip, colorless. A small bristle behind each posterior ocellus, a pair in front of the anterior ocellus, and one at the anterior angle of each eye, and an irregular row of eight across the middle of the dorsum.

Mouth cone large, reaching the mesosternum. Antennae somewhat less than twice as long as the head. Segments 1, 2, and 5-7 concolorous with the head, 3 yellow with apex almost colorless, 4 yellowish brown. 1 cylindrical, considerably wider at the base than at the apex; 2 urn-shaped with a broad pedicel; 3 clavate, 2.6 times as long as broad, scarcely pedicellate; 4-6 barrel-shaped, with a long broad pedicel; 7 spindle-form. Spines and sense cones colorless. Sense cones on segment 4 especially heavy.

Prothorax considerably shorter than the head and, including the coxae, about twice as wide as long. A heavy, colorless spine with a dilated tip on each angle; those on the posterior angles less than half as long as the prothorax (71 microns); the ones on the anterior angles and coxae a little shorter. A pair of conspicuous ones along each lateral margin. Dorsum with a number of smaller bristles; the surface covered with faint anastomosing lines which are more conspicuous along the anterior margin.

Fore femora short and considerably thickened (about half as wide as long). Fore tibiae also short, about five ninths as long as the femora, a short thick tooth on the inside of the apex. Fore tarsus with a heavy, slightly curved spine. Middle and hind legs rather slender. Pterothorax a little wider than prothorax, sides slightly convex.

Abdomen rather short and thick, abruptly rounded posteriorly; bristles rather short, only one pair almost as long as the tube, pointed. Tube .8 as long as the head and about half as wide as long, heavily chitinized, sides roughened with little warts which bear minute spines; terminal bristles considerably shorter than the tube, pointed. (To be continued.)

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A NEW GENUS AND TWO NEW SPECIES OF SPIDERS COLLECTED BY BUFO QUERCICUS (HOLBROOK)

BY C. R. CROSBY AND SHERMAN C. BISHOP.

Family LINYPHIIDAE

FLORICOMUS n. gen.

Type **F. floricomus n. sp.**

The male only is known. Abdcmen with a well developed dorsal sclerite. Head without impressions and armed with a single horn or protuberance arising just below the anterior median eyes. Embolic division of the genital bulb without the tail-piece present in *Ceraticelus, Ceratinopsis* and related genera. Hind coxae separated by less than the diameter.

Floricomus floricomus n. sp.

Male. Length, 1.25 mm. without the cephalic horn. Cephalothorax grayish yellow, narrowly margined with dark gray; viewed from above evenly rounded on the sides behind the middle; in front of the middle, the sides are nearly straight and strongly convergent, bluntly rounded in front; viewed frcm the side, the outline is gently arched over the posterior part, slightly depressed at the cervical groove and then arched rather steeply to the posterior eyes. Head only moderately elevated. Clypeus high, nearly vertical and slightly concave. Close under the anterior median eyes there arises a long, stout horn directed forward and upward, pointed at the tip (fig. 1). The upper surface of the horn is clothed with numerous capitate hairs increasing in length towards the tip of the horn. Each hair bears a large, recurved barb at the tip (fig. 4).

Posterior eyes in a straight line, the median separated from

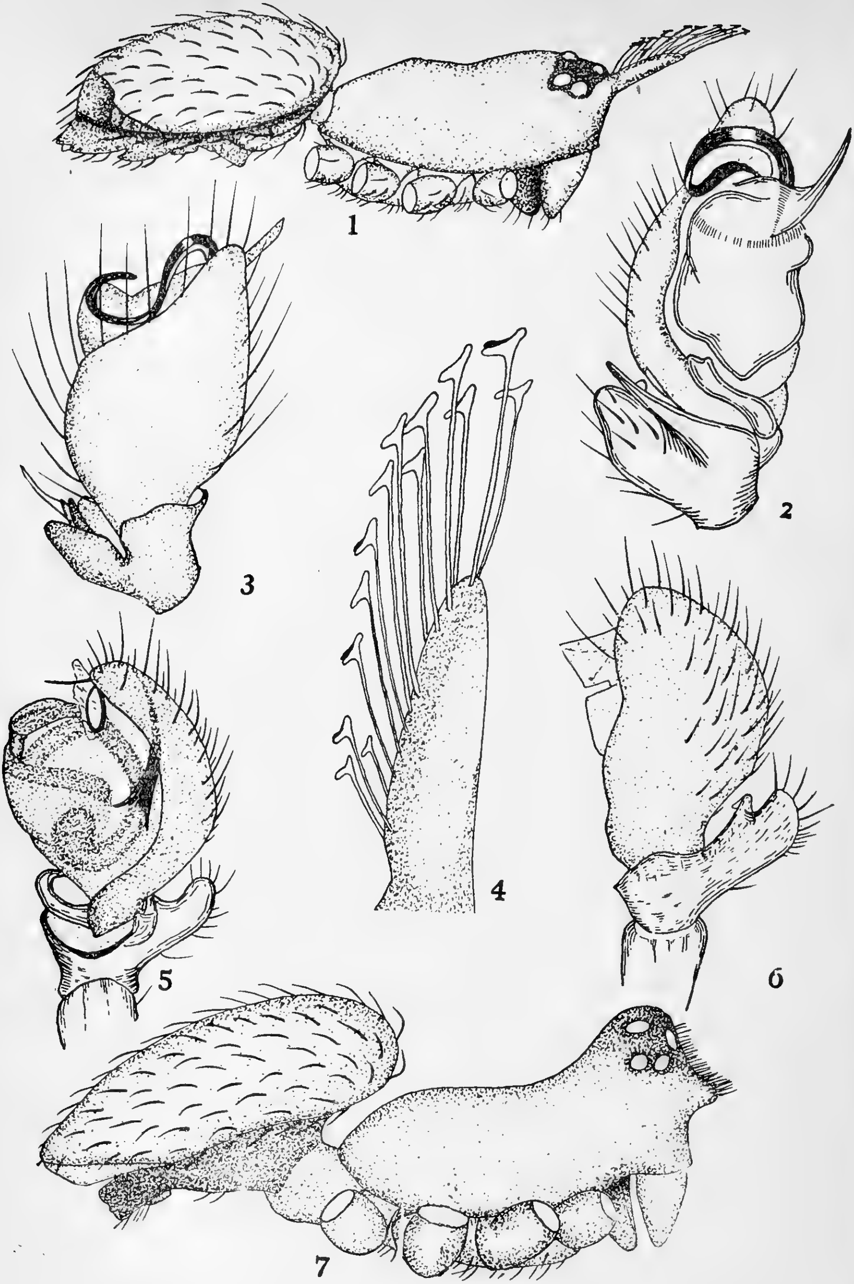

Fig. 1. *Floricomus floricomus.* Male, side view of body with legs removed.
Fig. 2. *Floricomus floricomus.* Right palpus, ventral view.
Fig. 3. *Floricomus floricomus.* Right palpus, dorsal view.
Fig. 4. *Floricomus floricomus.* The horn enlarged to show the structure of the hairs.
Fig. 5. *Floricomus pythonicus.* Left palpus, ventral view.
Fig. 6. *Floricomus pythonicus.* Left palpus, dorsal view.
Fig. 7. *Floricomus pythonicus.* Male, side view of body with legs removed.

each other by three-fourths the diameter and from the lateral by one half as much. Anterior eyes in a procurved line, the median placed close above the base of the horn, smaller than the lateral, separated by the diameter and from the lateral by the diameter of the latter.

Sternum broad, dark, widest between first and second coxae. Hind coxae separated by less than the diameter. Labium dark gray, endites lighter. Chelicerae short and thick, grayish yellow. Legs and palpus yellowish.

Abdomen with a large, strongly chitinized dorsal sclerite. Soft parts of abdomen dark gray. Ventral sclerites not in good condition for study, apparently not very well developed.

Femur of palpus straight, cylindrical; patella of the same thickness. Ratio of length of femur to that of patella 13 to 8. Tibia short, bearing a short, bluntly pointed dorsal process and on the outer side opposite the paracymbium there is a large rounded lobe bearing two strong spines, the inner the larger (fig. 3). Paracymbium small and very strongly curved, so as to almost form a circle. Tegulum large, the bezel strongly developed and produced ventrally into a long slender point. Embolic division without a tail-piece. The embolus arises from behind the bezel, makes a large free turn over the end of bulb, curves back on the dorsal side and then back so that the tip lies under the edge of the bezel, (fig. 2).

Holotype: male.

Georgia: Okefinokee Swamp, May 28, 1922. 1 ♂ (A. H. Wright).

Stomach of *Bufo quercicus* Holbrook.

Floricomus pythonicus n. sp.

Male. Length, 1.2 mm. Cephalothorax grayish yellow, margined with dark gray; viewed from above, broad and evenly rounded on the sides, narrowed towards the front and pointed in front of the eyes; viewed from the side, evenly arched behind the cervical groove, then rising steeply to the posterior median eyes, then rounded and descending to the tip of the clypeal protuberance. (fig. 7.) Below this the clypeus is very strongly concave. The protuberance appears triangular from above and beak-shaped from the side. It is thickly clothed above with short stiff erect hairs.

Posterior eyes in a straight line, equal, the median separated from each other by half the diameter and from the lateral by the diameter. Anterior eyes in a slightly procurved line, smaller than the lateral, separated from each other by about half the diameter from the lateral by a radius of the latter.

Sternum and labium dark, endites gray. Hind coxae separated by less than the diameter. Chelicerae short and stout, dusky yellowish. Legs and palpi brownish yellow.

Abdomen with a large strongly chitinized dorsal sclerite which is reddish brown, finely punctate and sparsely clothed with short, stiff, appressed hairs. Ventral sclerites not in good condition for study.

Femur of palpus nearly straight, cylindrical; patella short, wider distally. Ratio of length of femur to patella, 11 to 7. Tibia short with the dorsal apophysis strongly compressed laterally. This process viewed from above appears narrow and pointed but from the side it is broad, rounded above over the end, with a nearly square corner below; on the middle of the outer markin there is a large quadrate tooth or branch (fig. 6). The paracymbium small, thin and strongly curved. The genital bulb is of the same type as in *floricomus* but the bezel is not produced into such a long point ventrally. The course of the embolus is similar to that species but the first outward curve is not so prominent. (fig. 5).

Holotype, male.

Florida: Palm Beach, March 1919. 1 ♂ (Thomas Barbour) Stomach of *Bufo quercicus* Holbrook.

CONCERNING SOME TINGITIDAE FROM THE GULF STATES (HETEROPTERA)

By CARL J. DRAKE, Ames, Iowa.

Corythucha associata Osborn & Drake.

Common on wild or rum cherry, *Prunus serotina* Ehrh., at Starkville, Miss., July-August, 1921, collected by Mr. M. R. Smith and the writer.

Corythucha pallida Osborn & Drake.

Belmont, Miss., July 5, 1921, taken on wild mulberry by the writer. The Mississippi specimens agree with the type series and other specimens from the north in size, structure and color.

Corythucha celtidis mississippiensis, n. var.

Differs from typical form, *C. celtidis* O. & D., by the larger hood, more arched median carina and darker markings. The posterior portion of the hood is considerably larger, and more inflated posteriorly. The color markings are much broader, darker and more prominent. The other characters are quite similar to the typical form. Length, 4 mm.; width, 2.2 mm.

This variety feeds on the southern hackberry, *Celtis mississippiensis* Bosc. The type series, adults, nymphs and eggs, were taken by the writer at Columbus, Miss., June 22-24, 1921. *Holotype* (male) and *allotype* (female) are in the writer's collection; *paratypes* in collections of Mississippi Agriculture College, Iowa State College and writer. Other specimens are at hand from Georgia, South Carolina and Tennessee.

C. celtidis Osborn & Drake feeds on the sugarberry hackberry, *Celtis occidentalis* L., and is widely distributed in eastern United States. It may be easily separated from the new variety by its smaller size, lighter color and the hood and median carina.

Gargaphia amorphae Walsh.

Common on False Indigo, *Amorpha fruticosa* L. Aberdeen, June 26, 1921; Columbus, July 23-25, 1921; Prairie, July 27, 1921: Leland, Miss., Sept. 21, 1921, by the writer. *Gelchossa oblonga* Say was also taken in rather large numbers on the same food plant.

Gargaphia binotata Parshley.

Dunedin, Florida, Oct. 25, 1914, collected by Mr. W. S. Blatchley.

Stephanitis blatchleyi, n. sp.

Separated from *S.* (*Leptobyrsa*) *rhododendri* Horvath by its much smaller size much less inflated but longer hood, and narrower costal area of the elytra. It may be distinguished from *S. pyroides* Scott by the longer lateral carinae, the more strongly raised median carina, and the much smaller and less inflated hood. Length 3.2 mm.; width 1.7 mm.

Hood long, moderately large, extending a little in front of the head, the length nearly two and a half times its width. Head, except eyes and lateral margins, concealed by the hood, the spines very short. Rostrum stout, long, extending slightly beyond the rostral channel. Rostral laminae considerably raised, gradually widening posteriorly on the meso—and metasternum. Median carina distinctly arched in front of the middle (arch nearly as high as the hood), subequal to the hood in length, and connected to the median nervure of hood near the base, about the middle of the posterior portion. Lateral carina long, uniseriate, slightly sinuate. Paranota moderately expanded, mostly biseriate, elytra gradually expanded posteriorly, the tips rather widely separated and rounded; tumid elevation high and narrow, occupying almost all of subcostal and discoidal areas; costal area broad, with two rows of areolae at the base and with five at its widest part. Nervures sparsely clothed with a few, fine, long hairs; lateral margins of paranota and elytra finely and rather regularly serrate (two rows). Antennae rather long, moderately slender; first segment a little thicker and nearly twice as long as the second; third segment nearly two and a half times as long as the fourth. Bucculae contiguous in front.

General color yellowish brown with brown or fuscous markings. Tarsi and fourth antennal segment, except small basal portion fuscous. Median nervure of hood, a spot on median carina, three narrow, transverse streaks (mostly nervures) on costal area and a couple small marks on tumid elevation brown or fuscous. Body beneath brownish.

Type (male), Dunedin, Fla., Jan. 17, 1919, Mr. W. S. Blatchley collector, in writer's collection. *Paratypes* in collection of Blatchley. This species is very distinct and not easily confused with the North and South American species of *Stephanitis* and *Leptobyrsa.*

The generic characters of *Stephanitis* and *Leptobyrsa* need to be studied carefully. The hood, lateral carinae and length of elytra vary in different species. One North American species of *Leptobyra* has no lateral carina; in some species the hood is present and in others it is wanting.

Leptodictya tabida Herrich-Schaffer.

Brownsville, Texas, Dec. 19, 1910. This is the first record of the sugar-cane tingitid in United States. It is a fairly common species in Mexico and the West Indies and at times is of considerable economic importance.

Leptodictya plana Heidemann.

Columbus, Miss., June 24, 1921, and Starkville, Miss., Aug. 1921, collected by the writer. The specimens were swept from grasses but I was not able to locate the food plant.

Leptoypha costata Parshley.

This species was taken in large numbers on an ash tree, *Fraxinus* sp., at Aberdeen, Miss., June 26, 1921, by H. L. Dozier and the writer.

Leptoypha mcatella Drake.

Dunedin, Fla., April 8, 1921, W. S. Blatchely collector. This species feeds on wild olive, *Osmanthus americanus,* and the types were taken at Gainesville, Fla.

Teleonemia cylindricornis Champion.

Caledonia, Miss., June 25, 1921, M. R. Smith collector. Palaski, Ill., June 28, 1909, taken in an old cypress swamp. This is the first record of this lace bug in the United States. The specimens agree with Champion's description and figure, and with my specimens from Mexico, except that the subcostal area is slightly wider and contains two and a partial third row of areolae. This difference is not very marked and does not seem to warrant a varietal name.

Athaes angustroriparius Heidemann.

Taken in company with *A. mimeticus* Heid. and *A. insignis* Heid. at Tupelo, July 1, Belmont, July 5, Leland, Aug. 15, and Columbus, Miss., June 24, 1921, on *Desmodium* sp. Recorded heretofore from Florida and Texas.

THE CAMPHOR THRIPS IN FORMOSA

Ever since the Camphor Thrips (*Liothrips floridensis* (Wats.)) was discovered in 1912 there has been more or less speculation as to its origin. A survey of the state during the following two years showed that it was widely but not universally distributed wherever camphor was grown. It has never been taken on the Lower East Coast and camphor in that section, south of Cocoa, shows no injury. It also seemed to be absent from many localities in other parts of the state. Nevertheless its wide distribution indicated that it had been long in the state. Its spotted distribution and the severe injury it inflicted suggested an introduced insect (Annual Rep. Fla. Agric. Exp. Sta., 1913,p.lxiv.). For some time it was confused with the Bay Thrips *(Liothrips perseae* (Mason)), which led to the conclusion that it was a native insect.

The writer has recently received three adults from Prof. R. Takahashi of the Agricultural Research Institute at Taihoku, Formosa, Japan. Altho these specimens have somewhat larger and darker bristles than Florida specimens, there can be no doubt of their specific identity.

It would thus seem that the camphor thrips was introduced into Florida from Formosa with the camphor tree itself. Prof. Takahashi states that the insect is scarce in Formosa and the damage it does is consequently of little importance.

J. R. WATSON.

The

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MEETINGS OF THE SOCIETY

Nov. 8, The Society met in Science Hall with President J. S. Rogers in the chair and the following members present: Bates, Bratley, Berger, Cody, Floyd, Hubbell, Merrill, and Watson. Visitors present were Prof. H. B. Sherman of the Department of Biology, Chardkoff, Limebaugh, and Miller.

The resignation of Mr. Beyer as Secretary and Business Manager of the Entomologist was presented. The Society voted an expression of gratitude to Mr. Beyer for his long, faithful and efficient service to the Society. Mr. Homer Bratley was elected Secretary of the Society and Professor John Gray Treasurer and Business Manager of the Entomologist.

The paper of the evening was by Prof. T. H. Hubbell on "The Biology of the Grouse Locusts". He gave a detailed and comprehensive discussion of the food, breeding habits, habitats, and color variations of these small orthoptera. They feed mostly on decaying vegetation in the soil and inhabit moist ground along the borders of swamps and streams. They are of little economic importance. Unlike most orthoptera these insects are good divers and can remain under water for some time.

Mr. M. T. Inman, a chemist of the Kay Research Company of Pittsburgh, Pa., is spending the winter in Gainesville carrying on investigations with an insecticide called "aldehol," a mixture of comparatively high boiling point alcohols, aldehydides, and other oxidized hydrocarbons.

DISTRIBUTIONAL NOTES ON NORTH AMERICAN ORTHOPTERA—I.

BY THEODORE H. HUBBELL,
(Gainesville, Florida[1])

The following records are of interest because they present additional data concering some rare or local species which have been seldom recorded, or because they mark extensions of the known ranges of better-known forms. Unless otherwise indicated, the material is in the collection of the Museum of Zoology of the University of Michigan.

Mantoida maya (Saussure & Zehntner).

FLORIDA: Manatee, Manatee Co., viii.22.1925 (T.H.H.) 1 ♀; Orlando, Orange Co., ix.20.1924 (T.H.H.) 1 ♀ ;Archer, Alachua Co., viii.11.1925 (T. H.H.) 1 ♂, 1 ♀; Columbia Co., approx. 3½ miles north of the Santa Fe River, on the High Springs-Lake City road, vii.22.1925 (T.H.H.) 4 ♂, 2 ♀.

This little Mantid has been thought to be characteristic of the tropical element in the Floridian fauna, having hitherto been taken in the United States only in south Florida. Its discovery in some numbers as far north as Columbia County indicates that it probably occurs throughout peninsular Florida, and perhaps even in southeastern Georgia.

All of the specimens taken by the writer were found at night, while collecting with the aid of an electric headlight. A number of other supposedly rare species have been taken commonly in this way, and it seems probable that *Mantoida maya,* as well as many other interesting Orthoptera, has escaped attention chiefly on account of its nocturnal habits. No specimens were taken on lighted sheets set up near its habitat.

At Manatee a single female was swept from palmetto and dwarf oak scrub on cut-over sandy pine land. The Orlando specimen was taken on a bush of *Ceratiola ericoides* ("rosemary")—one of a patch growing beside the margins of a small pond in the "sand scrub" area 5 miles west of the town. This locality, now rapidly being subdivided, was also the habitat of a number of other interesting forms, including four new species of Cyrtacanthacrinae.

In Alachua and Columbia Counties *M. maya* was found in open groves of *Quercus catesbaei* on sandy soil—"high oak" as the habitat is locally known. At Archer this oak growth is more open, with tall grasses, dog fennel, and occasional *Ceratiola* bushes among the trees. The oak grove in Columbia County is dense enough to be called woods; under the trees oak seedlings, dwarf oaks, chinquepin and various bushes and herbaceous plants form a low but rather thick undergrowth.

Most of the specimens were taken by sweeping the oak and chinquepin undergrowth. Two pairs were taken in copula in Columbia County. The series obtained is the result of several hours of careful collecting.

Acrydium brunneri (Bolivar).

WISCONSIN: Mamie Lake, Vilas Co., vii.4-16.1919 (T.H.H.) 3 ♂, 5 ♀.

Taken in a drained bog of small extent, bordered by a growth of willows, alder, young aspens and other shrubbery. The specimens were found among clumps of withered sphagnum, burned logs and stumps, and patches of fireweed and other invading vegetation.

Neotettix proavus Rehn & Hebard.

FLORIDA: Tallahassee, Leon Co., iv.24.1924 (T.H.H.) 3 juv.; "Camp Torreya", 4 miles southwest of Rock Bluff Postoffice, Liberty Co., iv.24-26, 1924 (T.H.H.) 5 juv.; v.29-vi.2, 1924 (T. H. H.) 9 large juv.; vii.1. 1925 (T.H.H.) 1 ♂, 3 ♀; Rock Bluff Landing, Liberty Co., vi.1. 1924 (T.H.H.) 2 ♀; Gainesville, Alachua Co., vii.8. 1924 (F. W. Walker) 1 ♀ (Collection F. W. Walker).

The Leon County and Liberty County material was taken in heavy ravine forests composed largely of beech and magnolia; the Alachua County specimen in rich hammock of water oaks, live oaks, sweet gum, red bay, and many other trees.

Paratettix toltecus (Saussure).

TEXAS: Phantom Lake, Davis Mts., Jeff Davis Co., vi.21.1916 (F. M. Gaige) 1 ♀.[2]

LOUISIANA: Winnifield, Winn Parish, vi.30-vii.3.1918 (G. R. Pilate) large series.*[3]

FLORIDA: Chattahoochee, Gadsden Co., vii.28.1925 (T.H.H). 32 specimens.

The Louisiana and Florida series each contains about twice as many of the short as of the long forms. The Florida specimens were taken about the wet clay margins of a small pool on the flood-plain of the Apalachicola River, on the bare moist clay or in the marginal growth of close-cropped grass. Apparently

P. toltecus has not previously been recorded from Texas or Louisiana, and this constitutes the third Florida record.

Paxilla obesa (Scudder) .

FLORIDA: 4 miles west of Cottondale, Jackson Co., viii:2. 1925 (T.H.H.) 1 ♂.

GEORGIA: Thomas, Floyd Co., ix.9.1924 (T.H.H.) 5 ♂, 3 ♀ 1 juv. ♀ (5).

The Jackson Co. male was swept from low grass on moist mucky soil, at the margin of the *Hypericum* belt surrounding a dry cypress pond in pine woods. The Georgia specimens were taken in a patch of open swampy woods of sour gum and other trees, bordered by a grove of long-leaf pines. This species has been taken in large numbers in various parts of northern Florida by Mr. F. W. Walker and the writer; these records are reserved for a future publication.

Tettigidea prorsa Scudder.

FLORIDA: De Funiak Springs, Walton Co., vi.15.1924 (T.H.H.) 2 ♂, 5 ♀.

Found in small numbers in the margin of a small swampy depression, overgrown with brush and tall herbage. One male and two females macropterous.

Achurum sumichrasti (Saussure).

TEXAS: Cherry Canyon, Davis Mts., Jeff Davis Co., vii.9.1916 (F. M. Gaige) 1 ♀*.[4]

Alpha apache (Rehn & Hebard).

TEXAS: Phantom Lake, Davis Mts., Jeff Davis Co., vi.1. 1916 (F. M. Gaige) 1 ♂, 1 juv.*

Chloealtis abdominalis (Thomas)

WISCONSIN: Mamie Lake, Vilas Co., vii.16.-viii.6.1919 (T.H.H.) 7 ♂, 4 ♀.

Numerous in the drained bog mentioned under *Acrydium brunneri*, and also taken in the open grassy aspen groves bordering the lake.

Goniatron planum Bruner.

TEXAS: Phantom Lake, Davis Mts., Jeff Davis Co., vi.1-5. 1916 (F. M. Gaige) 3 ♂, 1 ♀.

Rehn[5] has recently recorded this species from numerous localities in western Texas and New Mexico; it was previously unknown from the United States.

Arphia sulphurea (Fabricius).

LOUISIANA: Winfield, Winn Parrish, v.13.-18.1918 (G. R. Pilate) 1 ♂, 1 ♀.*

FLORIDA: Houston, Suwannee Co., iv.28.1924 (T.H.H.) 1♂. The Florida specimen was taken in a sunny clearing in open, cut-over woods of sweet-gum, hickory and oaks. Leon County is the only other Florida locality.

Leprus cyaneus Cockerell.

TEXAS: Phantom Lake, Davis Mts., Jeff Davis Co., viii. 8. 1916 (F. M. Gaige) 1 ♂.*

NEW MEXICO: Organ Mts., Dona Ana Co., ix.5.1924 (W. A. Archer) 3 ♀.

Spharagemon aequale (Say).

ILLINOIS: Chicago, Cook Co., (C. T. Brues) 1 ♂.

Spharagemon cristatum Scudder.

LOUISIANA: Winnfield, Winn Parish, v.13.1918 (G. R. Pilate) 1 ♂, 1 ♀.*

Spharagemon inornatum Morse.

TEXAS: Cherry Canyon, Davis Mts., Jeff Davis Co., vi.28. 1916 (F. M. Gaige) 1 ♀.*

Trimerotropis agrestis McNeill.

COLORADO: Sedalia, Douglas Co., viii.7.1921 (A. I. Ortenburger 1 ♀; Morrison, Jefferson Co., viii.6.1921 (A. I. Ortenburger) 1 ♀.

Trimerotropis albolineata (Bruner).

CALIFORNIA: Claremont, Los Angeles Co., March 1916 (M. H. Hatch) 1 ♂, 1 ♀.*

Trimerotropis huroniana E. M. Walker.

MICHIGAN: Schoolcraft, Mackinac, Emmett, Charlevoix, Leelenau and Grand Traverse Counties.

This species, hitherto known only from Ontario, has been found to be the common beach grasshopper on the northern shores of Lake Michigan and Lake Huron. Detailed notes on the species will be published later.

Trimerotropis rubripes Rehn.

TEXAS: Phantom Lake, Davis Mts., Jeff Davis Co., vi.4.1916 (F. M. Gaige) 1 ♀.*

Reported from the Rio Grande region in extreme western Texas and up the valley to Albuquerque, New Mexico.

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[1] Contribution from the Department of Biology, University of Florida.
[2] Determined by J. L. Hancock 1918.
[3] All records followed by a star were determined by J. A. G. Rehn 1919.
[4] Determined by Rehn 1919 as *Achurum acridodes* Stal, recently shown by Hebard to be synonymous.
[5] Rehn, 1919—A Study of the Ligurotettigi. Trans. Amer. Ent. Soc., 49, 55.

A NEW SPECIES OF SYMPHYOTHRIPS (RETICULATUS FROM ARGENTINA

(Continued from page 30.)

Measurements. Body length 1.7 mm. Head, length .26 mm. width .22 mm.; prothorax, length .18 mm; width .36 mm; mesothorax, width .41 mm; abdomen, width .46 mm; tube, length .21 mm, width at base .12 mm., at apex .046 mm.

Antennal segments	1	2	3	4	5	6	7
length	36	59	95	86	74	60	78
width	50	38	36	40	38	35	31 microns.

Total antennal length .46 mm.

This species, altho plainly a *Symphyothrips*, has some structures which suggest other genera. The reticulated surface of the head and prothorax would suggest *Glyptothrips*, the strongly thickened fore femora *Nesothrips* and the tibial tooth *Kladothripinae*.

Described from a single female taken from the skin of a tangerine from Buenos Ayres at New York by Emile Kostal of the Federal Horticultural Board, July 2, 1924.

NETTLING CATERPILLARS

Three caterpillars which are provided with nettling hairs are common in Florida. They are the Saddle-back *(Sibere stimylea* Clemens), the larva of the Hag Moth *(Phobetron pithecium* S & A), and the larva of the Puss Moth *(Megalopyge opercularis* S & A). The result of coming into contact with the nettling hairs of these caterpillars varies greatly with different individuals. An instance of very severe pain caused by the Puss Moth larva has recently been reported by Mr. E. W. Pettersen, a drug-gist of Pensacola, who sent the caterpillar to the Experiment Station for identification. "The patient (a woman) was brought in from the country in a taxi. She had every sympton of suffering severely. Her arm near the elbow was very much swollen and very much inflamed. Almost her entire body was cold. She appeared very much depressed. We had to give a narcotic to relieve the pain followed by the usual treatment in such cases. The party recovered in two days."

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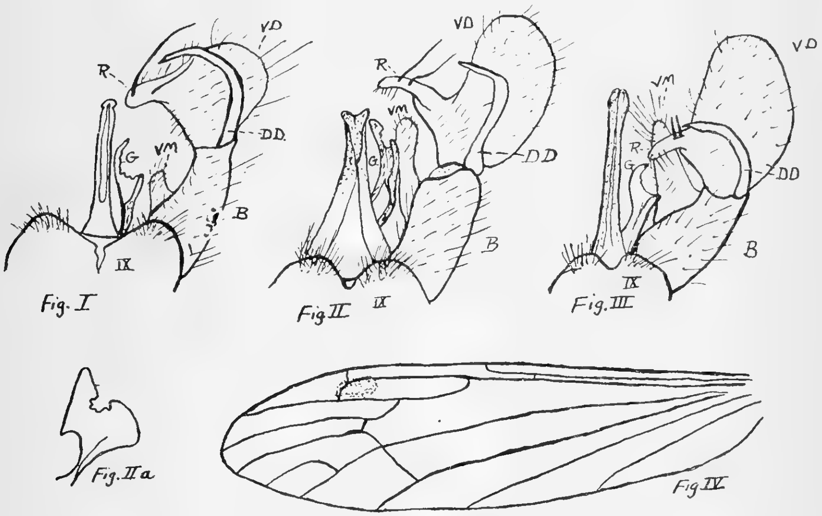
A NEW DICRANOMYIA ALLIED TO DICRANOMYIA IMMODESTA OSTEN SACKEN—TIPULIDAE, DIPTERA

J. SPEED ROGERS,
Dept. of Biology, Univ. of Fla.

During the past few years of ecological and distributional studies on the crane-flies, I have had considerable difficulty in



EXPLANATION OF FIGURES

Figure I. Male genitalia of D. gladiator O. S., dorsal view.
Figure II. Male genitalia of D. immodesta O. S., dorsal view.
Figure IIa. Gonopophysis of D. immodesta O. S., side view.
Figure III. Male genitalia of D. iowensis sp. nov., dorsal view.
Figure IV. Wing of D. iowensis sp. nov.

B—Basistyle
DD—Dorsal dististyle
VD—Ventral dististyle
R—Rostrum
IX—Ninth Tergite
VM—Ventro-mesal lobe of basistyle
G—Gonopophysis.

distinguishing Osten Sacken's species, *Dicranomyia immodesta* and *gladiator*. Part of the difficulty has been due to the existence of a third species, heretofore undescribed, whose geographic range and habitat distribution overlaps that of the above species.

Dicranomyia iowensis sp. nov.

Resembles in venation, size, and general body appearance *Dicranomyia immodesta* and *gladiator*. Differs from both of these species in that the thoracic notum and pleura are opaque, the antennae wholly dark brown, and the male genitalia distinctly different.

Rostrum straw yellow, tinged with brown at the apex and along the sides. Basal half of the first segment of the palpus yellow, the distal half and the remaining joints a dull dark brown. The antennae are dark brown thruout; the first basal joint long cylindrical, the second hardly half as long, the joints of the flagellum elliptical, with a few short setae and a thin pubescence. The vertex bright chestnut brown with a silvery reflection; occiput dark brown with a narrow silvery line along the margin of each eye.

The thoracic notum is a dull yellowish brown except that the lateral margins of the prescutum are a light opaque yellow. A single central dull brown stripe is well marked on the pronotum and anterior half of the prescutum but fades into the ground color on the posterior part of the prescutum. The usual position of the lateral stripes is frequently indicated by faint darker areas on the posterior half of the prescutum. The lobes of the scutum are faintly darkened; the scutellum and postnotum are slightly duller and darker than the rest of the thoracic notum. The pleura are a dull grayish yellow, somewhat lighter dorsally. The coxae and proximal halves of the femora are dull yellow, the distal halves of the femora and the tibia somewhat darker and the tarsi brown. The base and stem of the halters are yellow, the knobs dull, dark brown. The wings are entirely clear, save for a very faint, small, ovoid brown stigma. The veins are brown, the venation (figure IV) quite like that of *D. immodesta*.

The tergites of the abdomen are dull brown, the sternites yellow, more or less suffused with brown. The margins of the sternites are slightly shining. The genitalia of both male and female are yellow; altho dull, this yellow is conspicuous in contrast to the brown abdominal tergites. The ninth tergite of the male genitalia is broad and short with a deep, rounded, caudal notch. The rounded lateral lobes produced by the notch are chitinized on their caudal margins which bear about fifteen long, yellow setae. The basistyles are a little longer than broad, thinly covered with long, yellow setae. From their ventro-mesal margins large fleshy lobes, about as long as the basistyle itself, project caudo-ventrad, almost parallel from the base to apex. These lobes are covered with a moderate pubescence and bear numerous setae, particularly at their apices. The dorsal dististyle is an arcuated, cylindrical, chitinized rod, slightly dilated at the base and just before the apex. Beyond the second slight dilation it tapers abruptly to a short, stout, straight, apical spine. A chord drawn from apex to base of the dorsal dististyle is very nearly equal to the length of the basistyle. The ventral dististyle is a large, inflated, ovoid lobe covered with a short pubescence and bearing rather scattered setae of moderate length. At midlength it is a little less in diameter than the chord of the dorsal dististyle and is a little less than twice as long. On the mesal margin, about one fourth of its length from the proximal end, the ventral dististyle bears a prominent, fleshy rostrum, curved dorsocephalad. Near the base of the rostrum, on its caudo-dorsal face are two short, stout, chitinized spines set close together in a common groove. These spines are almost exactly equal in length. The cephalic face of the rostrum, near its tip bears five or six stout setae. The penis guard is long and subcylindrical. It narrows from a dilated base to a slender rod but becomes slightly dilated just before the faintly bilobed apex. The gonopophyses are prominent flat hooks, whose bases form vertical plates on either side of the penis guard and whose apices are directed dorsad. Between the base and apex each has a semicircular depression like the blade of a sickle, whose dorsal and concave edge is gently and slightly serrate.

The ovipositor is but slightly different from that of *immodesta* or *gladiator*, slightly shorter and more slender than in *gladiator*, the tergal valves more arcuated than in *immodesta*.

Holotype, male, Poweshiek Co., Iowa, Sept. 18, 1920 (Field Cat. No. 52).

Allotype, female, topotypic.

Paratopotypes, 4 males; paratypes: Poweshiek Co., Iowa, 3 males, 2 females, Oct. 10, 1920; 1 female, June 2, 1920; 1 female, Sept. 5, 1920. Hardin Co., Iowa, 2 females, May 20; 1920; 4 males, 2 females, May 21, 1920; 3 males, 4 females, May 22, 1920. Harrison Co., Ind., 5 males, June 18, 1921; Jefferson Co., Ind., 1 male, June 11, 1921; Washtenaw Co., Mich., 1 male, Aug. 6, 1921; 1 male, Aug. 24, 1921; 2 males, July 12, 1922; 1 male, June 6, 1922 (T. H. Hubbell); 1 male, Aug. 17, 1922 (F. M. Gaige).

Part of the paratypes from Indiana and Iowa are placed in the collection of Dr. C. P. Alexander; the holotype, allotype and other paratypes are in the collection of the Museum of Zoology of the University of Michigan.

Figured with present species are the genitalia of the males of *D. immodesta O.S.* and *D. gladiator O.S.* as I have identified these species from Osten Sacken's descriptions and his figure of the male genitalia of *D. gladiator.* The characters shown in these figures are constant in the series of each of these species that I have before me and the differences in body markings: three stripes on the prescutum of *gladiator*, one stripe on the prescutum of *immodesta;* the mesosternum of *gladiator* with rounded brown spots between the fore and middle coxae, the mesosternum of *immodesta* unmarked, fits in each series with the genitalia figured. There is a slight discrepancy between the male genitalia figured by Osten Sacken for *gladiator* and that figured for the species I am identifying as *gladiator.* I believe that this discrepancy is not greater than is to be expected when it is remembered that Osten Sacken drew his figure from observations on the living insect, while the present figure is made from a mount cleared in KOH and drawn as seen with a compound microscope.

Dicranomyia iowensis would seem, from the slight data now available, to be somewhat more western than *immodesta* or *gladiator.* Altho taken with these two species in Washtenaw Co., Michigan it was far less common than either. In southern Indiana, *iowensis* is far less common than *gladiator* but not so rare as *immodesta.* However, southern Indiana has other supposedly western crane-flies, *Gonomyia kansensis* Al, *Tipula flavibasis* Al. and is close to the southern limits of *D. immodesta.* In Iowa neither *gladiator* or *immodesta* were taken in the two localities where *iowensis* was common.

The immature stages of *iowensis* are unknown, the adults have been taken in situations much like those from which *gladiator* and *immodesta* have been commonly found, moist flood plains of small streams, wet grassy areas near springs, and from grassy, slightly shaded ravines.

TWO NEW THYSANOPTERA FROM CUBA

J. R. WATSON

CEPHALOTHRIPS MERRILL N. SP.

Measurements—Total body length 0.87 mm. Head, length 0.14 mm, width 0.11 mm; prothorax, length 0.10 mm, width (including coxae) 0.18 mm; pterothorax, width 0.177; abdomen, greatest width 0.16 mm; tube, length 0.08 mm, width at base 0.055 mm, at apex 0.025 mm; Antennae, total length 0.25 mm.

Segment	1	2	3	4	5	6	7	8
Length	18	36	40	41	40	35	31	19
Width	25	23	21	22	22	19	17	11 microns.

Color an almost uniform light olive gray (Ridgeway's color standard); head and tip of abdomen darker, antennal segment 3 and all tibiae and tarsi lighter except a black spot near the tips of tarsi; eyes and ocellar crescents deep red and very conspicuous. *Head* a little longer than wide, broadly rounded in front except for a projection of the vertex between the basal segments of the antennae; cheeks gently arched, slightly converging posteriorly, vertex smooth without bristles except the rather long (about as long as the eyes) but very slender, pointed post-oculars and two pairs of minute ones along the margins of the eyes, one directly behind and one in front of each posterior ocellus. *Eyes* rather small, not protruding, non pilose. *Ocelli* large, the posterior pair situated opposite the anterior third of the eyes, the anterior directed forward. *Mouth cone* short, reaching the middle of the prosternum, and rounded at the tip. *Antennae* nearly twice as long as the head. Segment 2 short barrel-shaped with a broad peduncle; 3, top-shaped; 4, obovate; 5, oval; 6, cylindrical; 7, cylindrical but tapering somewhat apically; 8, conical, broadly united to 7; 3-6 with short narrow pedicels, 8 with a somewhat broader one: 1, concolorous with the head; 2, lighter at apex; 3, much lighter except extreme base (but pedicel light); 4, about concolorous with the head; 5-8, darker, deep olive gray. Bristles and sense cones short, pale and inconspicuous.

Prothorax, somewhat wider than the head, shorter than the head; sides rather sharply diverging posteriorly. A rather long but pale bristle on each posterior angle, an equally long one midway between this and the median dorsal line. A pair of minute ones near middle of posterior margin.

Pterothorax at the anterior margin about as wide as the prothorax (including coxae) but sides converge sharply posteriorly. Wing membrane pale gray, constricted in the middle, reaching to about the 8th abdominal segment, sparsely provided with rather long hairs, 4 inter-located ones.

Legs rather short. Fore femora considerably enlarged. Fore tarsi unarmed.

Abdomen rather slender, sides nearly parallel to about 8th segment then tapering abruptly to tube. Bristles rather short, pale and inconspicuous; those on the last segment larger. Terminal ones but little longer than the tube.

Described from a single male taken from a scale-infested cocoanut from Cuba by George B. Merrill of the Florida State Plant Board.

The color of this insect and the shape of the pterothorax, will enable it to be readily told from the other two species of this genus.

The following key will enable one to readily separate the species:

a.—Antennal segment 7 broadly united to 6................*monilicornis* Reuter.

aa.—Antennal segment 7 pedunculate.

b.—Color dark brown; wings very short or entirely lacking; pterothorax narrower than prothorax, sides nearly straight and parallel, even; postoculars blunt ....*errans Moulton.*

bb.—Color light gray; wing membrane reaching abdominal segment 8; pterothorax wider than prothorax (exclusive of coxae), sides sinuate and sharply converging posteriorly; postoculars pointed *merrilli n. sp.*

FRANKLINELLA CEPHALICA BRUNERI N. VAR.

Female

Measurements: Total body length (average of 33 individuals) 1.02 mm. (varies from .82 to 1.25 mm.). Head, length 0.11 mm., width 0.16 mm.; prothorax, length 0.14 mm., width 0.19 mm.; mesothorax, width 0.27 mm.; abdomen, greatest width .28 mm.

Antennal segments	1	2	3	4	5	6	7	8
Length	26	42	58	54	41	51	9	12
Width	25	25	23	23	20	20	8	6 microns

Total length 0.28 mm.

Color, almost uniform yellow, thorax and end of abdomen a shade darker than the basal segments, head considerably lighter, pale yellow. No orange or brown color anywhere on the body except the yellowish orange ocellar crescents and a small orange spot on the extreme tip of the abdomen. Eyes black by transmitted light, red by reflected.

Head nearly half again as broad as long, considerably retracted into prothorax; cheeks slightly arched, bearing a pale short spine at about the middle; vertex smooth; frons depressed. Postoculars and a pair of bristles in front of each posterior ocellus nearly as long as the eyes, sharply curved, brown and conspicuous. A pale, slender, inconspicuous bristle at the inner posterior angle of each posterior ocellus, and a pair of even smaller bristles in front of the anterior ocellus. Eyes rather large, nearly half as long as the head, not protruding, pilose, facets large. Ocelli large, pale, posterior pair situated a little in front of the posterior border of the eyes, anterior directed somewhat forward into the frontal depression. Mouth cone long and slender, almost reaching the mesosternum. Maxillary palpus 3-segmented, the basal segment the longest.

Antennae 2.5 times as long as the head. Segment 1 short, cylindrical; 2 barrel-shaped with a wide peduncle, produced dorsally and bearing at the apex of the elevation two heavy bristles. These bristles are not as heavy as in *F. cephalica masoni* and the elevation is much less marked and does not project over the base of segment 3; 3 widest at about two-thirds its length, thence tapering uniformly with nearly straight sides to a narrow peduncle with several constrictions and to a broad apex. It bears a colorless dorsal, forked, trichome and below the base of this a pair of bristles which are fully as heavy and considerably longer than the corresponding ones on segment 2; 4, similar to 3 in shape but peduncle wider and shorter and sides not as straight. This segment also bears a forked trichome but on the inner side; 5 much the smallest of the intermediate segments with a narrower peduncle than 4; 6 conical, but little constricted at the base; 7 cylindrical, considerably shorter than 8; 8 conical. 1 almost colorless, 2 almost uniformly light brown except the paler peduncle; 3 light Marguerite yellow (Ridgeway's color chart) clouded with darker gray in the apical third; apical half of 4 and 6 mummy brown (Ridgeway) basal half of 4 and often all of 5 Marguerite yellow, 5 sometimes clouded with brown in apical third, 7 and 8 a little lighter than 6.

Prothorax wider than long and wider and longer than the head, sides strongly arched. One bristle on each anterior angle and a pair on each posterior angle are unusually large and strongly curved. The longest on the posterior angle often reaches a length of 80 microns or nearly half the width of the prothorax; another stout bristle (but only about a third as long) at the anterior angle; on the anterior margin are a pair of bristles nearly as stout and four pairs of minute colorless ones.

Pterothorax much wider than the prothorax, anterior angles evenly rounded to the posterior margin of mesothorax. Metathorax narrower, sides nearly straight and parallel. Two large bristles and two smaller ones between the wings and two large ones and about 12 smaller ones along the anterior margin. Legs light brownish yellow, considerably lighter than the body. Tibiae provided with a pair of stout spines near the apex.

Wing membranes reaching to about abdominal segment 9, fore pair very light grayish yellow, provided with heavy bristles, about 25 on costa, 19-21 on anterior vein, and from 14 to 21 (usually 19) on posterior.

Abdomen, rather short and thick, widest at about segment 8, thence rounding rapidly to tenth segment. The posterior segments (5-9) provided with heavy, but comparatively short, curved bristles at the posterior angles. The 10th segment split open for not over a fourth of its length, tipped with orange at the extreme apex. Provided with about a dozen large straight brown bristles which extend far beyond the tip.

Male. Much smaller than the female, about 0.8 mm., pale yellow. Head, length 0.11 mm., width 0.15 mm.; prothorax, length 0.15 mm.; width 0.19 mm.; mesothorax, width 0.20 mm.; abdomen, width 0.15 mm. Antennae, segment 1, 25; 2, 39; 3, 49; 4, 46; 5, 38; 6, 46; 7, 7; 8, 11 microns. Total length 0.26 mm. Wings with about 22 strong bristles on costa, 16 on anterior vein and 13 on posterior. Second segment of antennae much lighter in color than in female; lighter than the first. Testes yellowish brown by transmitted light, yellow by reflected.

Larvae brownish yellow, legs and tip of abdomen lighter. Eyes dark.

Described from thirty females and four males collected by Dr. S. C. Bruner in Santiago de las Vegas and on the Peninsula de Guanahacabibes, Cuba, on oranges, avocadoes, hibiscus, *Moringa*. Type in the author's collection.

Close to *F. cephalica melanommatus* Bagnal, of which it is probably only a Cuban race, but differs in the color and form of the second antennal segment which projects but little dorsally and not at all forward over segment 3, in the larger number of spines on the posterior vein of the fore wings (in both sexes) and in the split end of the last abdominal segment, and especially in the long, stout, curved bristles.

It can be told at a glance from *F. cephalica masoni* by the lighter color and the character of the second antennal segment.

The

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MEETINGS OF THE SOCIETY

Dec. 11, 1925.—Meeting called to order by Vice-President Bates. Members present: Bates, Berger, Bratley, Hubbell, Merrill, Rogers, Watson; visitors: Grossman, Inman, Tissot.

Dr. M. D. Leonard of Orlando, entomologist of Wilson Toomer Fertilizer Co., was elected a member of the society.

Mr. Watson gave the paper of the evening on "The Reactions of Whiteflies to Light, Heat, Gravity, and Certain Chemicals with Some Comparisons with the Behavior of Scale Crawlers and Rust Mites to the Same Stimuli."

Jan. 8, 1926.—Meeting called to order by Secretary Bratley. Members present: Berger, Bratley, Gray, Hubbell, Merrill, Watson; visitors: Grossman, Inman, Tissot.

New members elected were E. F. Grossman, an Entomologist of the Experiment Station in charge of boll weevil investigations; M. T. Inman, of the Kay Research Company, who is experimenting with insecticides, and A. N. Tissot, Assistant Entomologist of the Experiment Station.

The following officers were elected for the year: President, Prof. John Gray; Vice-President, E. F. Grossman; Secretary, H. E. Bratley; Treasurer and Business Manager of the Entomologist, A. N. Tissot; Editor, J. R. Watson.

The paper of the evening was by Dr. E. W. Berger on "Some Mosquito Controls."

THE CITRUS APHID IN CUBA

The following letter from Mr. J. B. Anderson of Santa Clara in regard to the status of the new citrus aphid in Cuba should be of interest to our readers:

"Here in this province (Santa Clara) I have been pretty well over the groves, and find it universal; just this morning I was out to see some little recreation farms, owned by friends here in town. One place has about 20 trees, and the other, at a distance 10 miles removed from the first, has about 100 trees. Both are badly infested, although there is not active work going on now as there is no new growth.

"In this province, near the town of Manacas, near the Mantanzas province line, there are six German-American orange growers, with a total of about 100 acres of orange groves scattered over a dozen square miles, and all the groves have the aphis, being dormant at present, but having been worked pretty thoroly as shown by the hardened curled leaves.

"When I was in Camaguey a month ago, a Cuban grower with about 50 acres told me that all his trees were infected and also that all the other groves around were in the same shape; these are within 5 miles of Camaguey city.

"The La Gloria district, where my groves are, was gone over very thoroly by me just before I wrote you the first of the year; practically every grove is infected and much damage done.

"Thus I know personally that it has taken full charge of our groves in these central provinces.

"As to how long it has been a pest, I can say that I have noticed the characteristic tight curling of the leaves for the past three years, and they tell me in La Gloria that it has been there for four years, but never abundant enough to excite comment even. We just supposed that it was curling by dry weather or something like that. Just this year it shot out like wildfire all at once in all groves."

Mr. A. C. Mason, of the Bureau of Entomology, U. S. Dept. of Agric., who has been stationed at Lindsey, Calif., where he has been studying the California orange thrips, has been transferred to Hawaii, where he has taken up the study of the Mediterranean fruitfly.

NEW THYSANOPTERA FROM FLORIDA—XIII

J. R. WATSON

92. Podothrips semiflavus Hood.

Mr. George B. Merrill on October 1, 1924 collected a number of thrips of this species from a swamp grass collected at Davie by Bowers and Link of the State Plant Board. It has been reported from Cuba and Porto Rico on sugar cane. The writer has received it from the Virgin Islands when it was collected on Para grass by Mr. C. E. Wilson. The present find extends its known range to Florida and adds a new host.

93. Chirothrips obesus var. hubbelli n. var.

Female. Abdomen, pale brownish yellow (warm buff—Ridgeway's color standard) tip, darker (segment 10 raw umber); head raw umber; thorax yellowish brown (prothorax buckthorn brown, pterothorax mummy brown); legs empire yellow, all femora and middle and hind tibiae shaded with brown on outer side; antennal segments 1 and 2 lemon chrome, 3 pinard yellow, 4 buffy brown, 5 raw umber, 6 to 8 blackish brown.

Measurements: Total body length 0.7 mm.; head, length 0.09 mm., width 0.114 mm.; prothorax, length 0.125 mm., width (including coxae) 0.25 mm.; mesothorax, width 0.28 mm.; metathorax, width 0.25 mm.; abdomen, greatest width 0.28 mm.

Antennae

1	2	3	4	5	6	7	8
30	43	35	30	28	44	13	12 microns

Total length 0.23 mm.

Head, considerably wider than long, broadest across the posterior margin of the eyes, cheeks well arched, short, about a third the length of the eyes, front produced into a triangle in front of the eyes, the two front sides of this triangle (across the bases of the antennae) almost straight but slightly produced between bases of antennae, tip with minute notch; surface with several rather prominent longitudinal striations and a single pair of bristles near the anterior angles of the eyes.

Eyes rather large, dark, pilose. Ocelli situated more anteriorly than in most species of the genus, posterior pair about opposite the middle of eyes, bordered by wide dark red crescents. Mouth cone reaching rather more than half way across prosternum.

Antennae 2.5 times as long as head. Segment 1 rounded, about three-fourths as long as wide; 2 inverted foot-shaped, but the "toe" very short, the axis and the width along apical margin about equal; 3 pyriform with a short peduncle; 4 and 5 suboval. Very thick, curved, colorless, sense cones on inner margins of segments 3 and 4, a few short, inconspicuous bristles on segments 5 to 8.

Prothorax trapezoidal in shape, sides diverging sharply posteriorly, quite deeply indented above fore coxae. Both anterior and posterior angles sharp, destitute of conspicuous bristles. Pronotum with anastomozing striae and about 12 pairs of small bristles.

Sides of mesothorax very convex, of metathorax only slightly so and diverging posteriorly.

Fore legs short and much thickened.

Wings very long (length ten times the greatest width), much exceeding the tip of the abdomen, curved, shaded with gray, fore pair deeply so but with a clear area just above the base, sparsely fringed with long ırs for its entire length. Posterior veins of ıore wings branch off from the anterior at the apex of the clear area (about a fifth of the length) bearing but two spines, one near the middle and another towards apex. Anterior vein with four spines, two near the base and two near apex.

Abdomen short and thick. Segment 10 split open above. Segment 9 also narrow. Spines on segments 8 to 10 moderately long. Receptaculum seminis over base of ovipositor bright reddish orange.

Male unknown.

Described from a single female taken in Dixie County, Florida, from grass and roots at margin of a cypress pond, by T. H. Hubbell, Nov. 28, 1925. Type in the author's collection.

Close to *E. obesus* Hinds, but differs in the shorter head, the more anterior position of the ocelli, the longer antennae, the less compressed first antennal segment, the shorter projection on the second segment, the diverging sides of the metathorax, the wings with a complete fringe of hairs and fewer bristles on the veins, and the absence of a long spine on the posterior angle of the prothorax. From *C. spinceps* Hood it differs in size, the fewer spines on the front of the head, the longer prothorax and the shape of the fore tibiae.

KEY TO NORTH AMERICAN SPECIES OF CHIROTHRIPS

1. A single longitudinal vein in each fore wing..............................*mexicanus.*
2. Two longitudinal veins in each fore wing; fore wings brown.
   - a. Two long, stout spines at each posterior angle of the prothorax.
     - b. Antennal segment 6 about as long as 4 and 5 together. —*insolitus.*
     - bb. Segment 6 shorter than 4 and 5 together......................*manicatus.*
   - aa. A single long, stout spine at each posterior angle............*spiniceps.*
   - aaa. Spines at the posterior angles of the prothorax only moderately long.
     - b. Body uniformly brown.
       - c. Only one moderately heavy bristle on each posterior angle of prothorax; antennal segment 5 nearly as thick as 4.- - —*floridensis.*
       - cc. Two shorter bristles on each posterior angle of prothorax, antennal segment 5 much smaller than 4. —*floridensis catchingsi.*

bb. Abdomen lighter.

c. Abdomen gray brown or yellowish brown; length 0.78 mm. —*crassus.*

cc. Abdomen yellow.

d. Thorax yellow ochre shaded with gray; length about 1.1 mm.; front of head with numerous small spines. —*vestis.*

dd. Thorax yellowish brown; length 0.7 to 0.8 mm.; front of head with one or two pairs of spines.

e. Posterior ocelli opposite posterior border of eyes; each vein of fore wing with 4 to 6 spines.— —*obesus.*

ee. Posterior ocelli opposite middle of eyes; anterior vein with 4, posterior with 2 spines. —*obesus hubbelli.*

94. **Liothrips muscorum** n. sp.

Male.

Color, including even the tarsi of the legs, a uniform dark brown, thorax and abdomen with much blood red hypodermal pigment, antennal segments 3-6 mostly yellow.

Measurements: Total body length 1.17 mm. Head, length 0.22 mm., width, 0.185 mm.; prothorax, length 0.127 mm.; width (including coxae) 0.29 mm.; pterothorax, greatest width 0.33 mm.; abdomen, greatest width 0.34 mm.; tube, length 0.15 mm., width at base 0.06 mm., at apex 0.037 mm.

Antennae, segment 1, 30; 2, 43; 3, 80; 4, 74; 5, 63; 6, 61; 7, 51; 8, 32 microns.

Total length, 0.44 mm.

Head but little longer than wide, widest some distance behind the eyes, cheeks arched, converging quite sharply posteriorly, dorsal surface finely striated. Postocular bristles about .6 the length of eyes, blunt. Eyes rather large but diameter somewhat less than the distance between them, dark, not pilose. *Ocelli* straw colored, posterior ones contiguous to the inner margins of the eyes in front of their middle, the anterior one facing forward, inconspicuous, on a line with the anterior border of the eyes.

(To be continued.)

The State Plant Board has at the Lake Alfred Station nearly a thousand of the Chinese lady beetles *(Leis* sp.) for distribution to the growers as soon as the citrus aphid becomes sufficiently abundant to insure a constant food supply. These lady beetles have been bred by Mr. W. L. Thompson. There are also a few hundred of these beetles at the Experiment Station at Gainesville where they have been bred by Mr. H. E. Bratley. At both places they have been mostly dormant during December and January.

The State Plant Board has secured the services of Mr. R. L. Miller to take charge of the experiments in control of the new citrus aphid which are being conducted at the Citrus Substation at Lake Alfred. Mr. Miller secured his master's degree at Ohio State at the close of the fall quarter there.